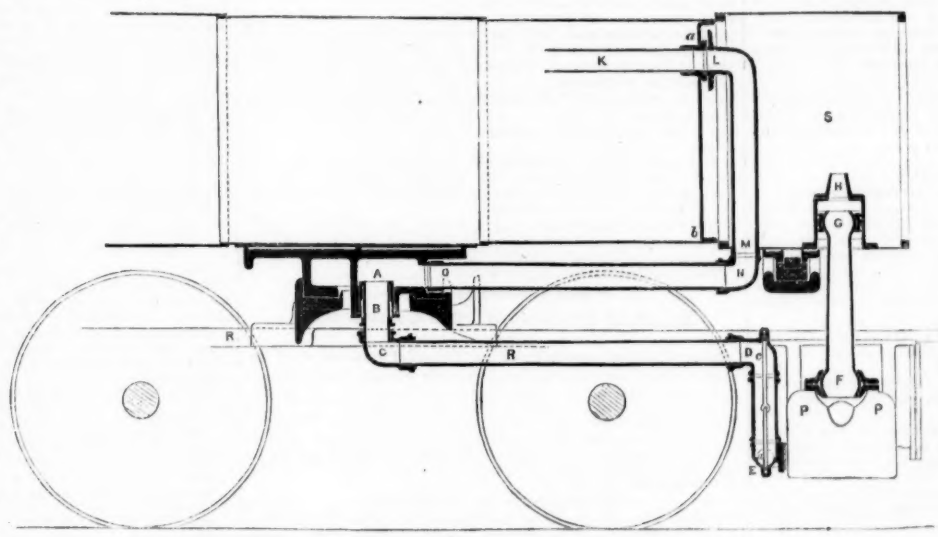
RAILROAD GAZETTE

SATURDAY, DECEMBER 26, 1874.

Steam Pipes for Double-Truck Locomotives.

We illustrate herewith a plan for the arrangement and connection of the steam and exhaust pipes for double-truck locomotives which has recently been patented by Mr. William Mason, of Taunton, Mass., the well-known locomotive manufacturer. As most of our readers know, in the form of engine for which this improvement is intended, the driving axles are attached to a separate truck frame, which turns about a center-pin, and the driving-wheels can thus adjust themselves to the curves of the track, just as the wheels of an ordinary truck do. The cylinders are then attached to the truck-frame, and consequently the steam-pipes which convey steam to them from the boiler must be connected by a flexible joint. This is the difficulty for which most master-mechanics and engineers feel most apprehension with this class of engine, and it is one which has in fact heretofore given more or less trouble. If, however, it is the only objection to the use of this plan of locomotive, it is quite sure to be overcome by ingenuity and experience; and considering the other very great advantages which result from this plan of building locomotives, the difficulty with the steam pipes should not long stand in the way of the success of the system.

The object of Mr. Mason's invention is to overcome the objections which have been urged against the use of the flexible pipes. This he aims to do by conducting the steam to the smoke-box by an ordinary dry-pipe, *K*. From this it is carried down through the bottom of the smoke-box by a single vertical pipe, *L M*. It is then conducted by a pipe, *N O*, to a hollow-center casting, *A*, which is attached to the boiler. This casting forms the top center-plate for the truck. Another casting, *B*, is attached to the truck frame, and forms the lower center-plate. This has an opening in the center, through which a pipe, *B*, extends, and is attached to the top casting *A* by a loose joint and a stuffing-box. The steam is then conveyed from th echamber cast in *A* by the pipe *B*, and thence by the pipes *C*, *D*, *E*, to the cylinders. The only motion which the truck frame has is a lateral one around the center *B*, as it is supported vertically by guides shown on the left of the letter *N*, but not indicated by any other letter. The only motion, therefore, which the steam pipes have is about the center, *B*, of the truck, and consequently the only loose and flexible joint which is necessary is the one at *B*.



The exhaust pipe *C F* has two spherical joints, one at the top and the other at the bottom. The top one is attached to a piston which moves in the cylinder so as to compensate for the vertical movement which would result from the radial motion of the pipe about the center *F*. The exhaust steam then escapes through the nozzle *H* into the smoke-box *S*. Since the drawing from which our engraving was made was furnished us, we have learned from Mr. Mason that he has abandoned the use of the spherical joints and piston in the exhaust-pipes. Instead of this he has adopted the much simpler method of attaching the pipe *C F* rigidly to the cylinders and then elongating the opening in the bottom of the smoke-box through which the pipe enters, so that it can move freely crosswise as the truck vibrates about the center *B*. This arrangement dispenses with both of the joints in the exhaust pipe and reduces it to the utmost simplicity. There is then but one flexible joint in the whole system of pipes, which ought not to be more difficult to keep tight than the stuffing-boxes of the piston-rods. It will be seen that the end *B* of the pipe *C D* is attached to a vertical pipe *D E*, so that the latter will give enough flexibility to allow for the expansion and contraction of *C D*.

Monthly Meeting of the Master Car-Builders' Association.

This association held its monthly business and social meeting Thursday, December 17, at the rooms at No. 113 Liberty street, New York.

The meeting was called to order by the President, Mr. Garey, who announced that the subject for consideration was "Car-wheels, the best method, flange wear and causes." He added that he had been requested to ask why old wheels could not be remelted and recast. The iron seems to be good for nothing after it has once been melted, but there should be some process by which it could be made available more than once. Yet the wheel-makers object to taking old wheels for use a second time.

Mr. Jonathan Scoville, of Buffalo, said if the old wheels were uniform in quality and soft enough there would probably be no objection to them, but they are never uniform, and as a general thing they are hard, and when melted still harder. In a lot of returned wheels, where you get 100 wheels fit to remelt you will yet 300 that are not fit.

Mr. W. W. Snow, of the Ramapo Works, said that nearly all wheels are supposed to be made from charcoal iron. If these wheels first made from charcoal iron when used the second time were remelted with charcoal, he was of the opinion that they would not deteriorate. But as they all used anthracite coal in melting iron, in which there is more or less sulphur, the iron becomes impregnated with the sulphur and the quality is deteriorated in proportion. After the sulphur is once in the iron I have observed that the tendency to take up more is very great, and the second and third melting, and perhaps the fourth, produce nothing but common anthracite iron, if we don't mix with it soft charcoal iron at each melting. He related an experience which he had about ten years ago in attempting to cast a lot of wheels from No. 3 Salisbury iron with anthracite iron. After two failures he succeeded in getting a chill, but the wheels were so brittle that it was unsafe to ship them, and he was then satisfied that the failure was due to the use of anthracite coal in which more or less sulphur was present.

Mr. F. D. Adams, of the Boston & Albany Railroad, asked whether, if old wheels were melted with charcoal, they would be good.

Mr. Snow thought they would. A French experimenter, some years ago, succeeded in getting an increase in the strength of iron up to some seven meltings, but the iron used was a coke iron of very low quality.

Mr. Scoville said if you take Salisbury iron No. 1 and remelt it, it will increase to No. 4; remelt it again and the specific gravity will increase, but the iron has virtually no strength at all, and that is really what ails old car wheels. It is already at its maximum strength if it is a good wheel; if it is a poor wheel it is past it. You must use your own judgment in mixing something with it if it is a good wheel to increase its strength.

Mr. Adams.—Then melting with charcoal would not restore the original strength of the iron?

Mr. Scoville.—It would not have the same effect that anthracite would, but it would not entirely restore the strength for the reason that the blast keeps burning the carbon and the iron becomes brittle. Nearly all the car-wheel irons in this country have a specific gravity of 7.25. Below that they will not chill at all. Above that they become so brittle that they are practically white iron.

Mr. Adams.—If I understand Mr. Snow's proposition, there is a certain amount of sulphur in coal which impregnates the iron in melting. Would not the wheels be improved if they were melted with coke, which has less sulphur than coal?

Mr. Scoville.—We use coke almost entirely.

Mr. Snow.—I expect it is pretty difficult to get coke free from sulphur.

Mr. Hopkins.—If an old wheel has been hardened to a point beyond No. 4; if a portion of No. 3 is added would not that bring it back to No. 4?

Mr. Snow.—Yes, but the question is to just hit that exact proportion.

Mr. Hopkins.—I am puzzled to know whether the wheel-makers themselves know exactly what the standard of their iron is when it goes into car-wheels.

Mr. Snow thought all wheel-makers would agree that the pig-iron out of which their wheels are made, invariably shows a higher tensile strength than after they are remelted, and the question arises: hasn't the sulphur in anthracite coal had something to do with it?

Mr. Scoville thought if you should remelt No. 3, a tensile strength of 25,000 lbs. to the inch, into a No. 4 car-wheel, it would probably stand the same; but you remelt a No. 4 and it would undoubtedly not stand as much, because No. 4 is almost at its maximum strength. But the trouble is that old wheels are so poor and quantities of them are made of anthracite metal. A wheel made by a good maker, of good charcoal iron, is good still, but if it is originally made of bad iron it is bad still. The chill does not injure the iron, as many suppose.

Mr. W. R. Davenport said he would like to ask whether some other disposition could not be made of old wheels than putting them into new wheels. Old wheels mixed with pig metal in a puddling furnace will give splendid results in rolling bar iron. Every railroad company uses enough merchant bar iron to consume every old wheel that it has to sell. Then why expect wheel-makers to take old wheels when they can be sold to the rolling mills, that can use them to advantage and improve the quality of the iron thereby? I don't know any square, up and down wheel-maker that wants old wheels. We cannot put old wheels into new wheels and put our name on them; we can't afford to do it, and you can't afford to have us, either. Railroad companies will find that out. The attempt to force old wheels on to car-wheel makers of course necessitates one of two things: either that they put these old wheels into new, to the detriment of the new, or that they try to sell them at a loss, while the exchange might be made to better advantage by the railroad companies with the rolling-mill companies. There may be now a little trouble in getting good prices for old wheels, but if the railroad companies had been careful and exchanged them for merchant bar all the time they would not have had the old wheels now.

With reference to remelting, he thought specimens of anthracite coal might be selected free from sulphur, but the majority in market contains so much that they had been compelled to seek the coke that should be the most free from sulphur that could be used in a cupola, and others had decided to do the same. He did not think that the tests taken from car wheels would show any great deterioration, nor that you would find any great difficulty from breakage in a first-class wheel. Of course you can get wheels made of anthracite iron that won't stand it. But if the companies are disposed to pay a fair price for a good wheel, they can get a wheel that will not break.

Mr. Hopkins thought the best wheels that can be made should be bought, even if they cost $5 per wheel more, and that railroad companies would find them the most economical in the end.

Mr. Adams said the fact mentioned by Mr. Davenport was entirely new to him, that the strength of bar iron was increased by the application of old wheels. If this was true he thought they should have no trouble in getting rid of their old wheels.

Mr. Snow said he had known this to be a fact for some years. They had been obliged to take a good many old wheels, and they had four customers who took from them a - nually a certain number for putting into plate iron, and they testify that they make the best plate iron of any iron they can get. The old wheels are first puddled, of course—go through the regular process, but it necessitates an increase in the cost of plate iron, and it would be the same with bar iron. Therefore, if railroad companies give us the wheels to put into new iron they must expect to pay more for the iron produced. That it makes a better iron there is no question at all, according to the testimony of the best iron makers in the country, based on experiments.

Mr. Garey suggested that it would be well for railroads to go to manufacturing their own bar iron and thus dispose of their old wheels.

FITTING OF WHEELS.

The topic of the fitting of wheels being now called up, Mr. W. E. Chamberlain said their wheels were bored out with 3-64 taper and the axles turned the same and fitted under 30 tons pressure; nothing less than that.

Mr. Adams said that most wheel-fitters calculate to drive them according to the strength of the wheel; that is, if they go up to 40,000 pounds pressure and find the wheels won't bear it, they let down to 10 or 15 tons. There are wheels that will stand 75,000 or 80,000 pounds and not show any defect or fracture, and others that will fracture at 25,000 or 30,000 pounds; but of course that does not affect the question of what would be right. Their wheels were fitted at about 50,000 pounds, and they didn't have many loose wheels.

Mr. M. N. Forney asked if there was not a considerable difference in the quality of the wheels: whether a soft wheel would not press on very much easier than a hard wheel, and, therefore, when the wheel is hard if it is not necessary to bore the hole of a larger diameter. Another thing: he thought if you press a taper axle into a straight hole it would tend to split the wheel.

Mr. Adams thought the difficulty in fitting wheels was that the fit was not perfect; it bears on either one end or the other of the hub. The closer the fit the less the necessity of a severe strain.

Mr. Garey asked what was the object of turning axles tapered.

Mr. M. T. Wood said his experience was that it was almost impossible to bore a straight hole on an ordinary wheel-boring machine. The cutter will invariably wear away on the inside of the face, and as soon as the edge of the cutter drops on the outer face of the wheel, you shove it off and it leaves the wheel slightly tapering. A firm wheel will apparently resist the wear of the tool more than a soft one does. He allowed 7 16 of an inch in the axle, in pressing on 15,000 or 20,000 pounds, will be all the pressure necessary for half the distance, but in the last inch and a half it will rise rapidly to even 40,000, and his practice had been never to allow a wheel to leave the press until the gauge indicated at least 40,000.

Mr. Adams said he found that the lots of wheels differed in quality, so that the same gauge would not fit them all.

Mr. Davenport said that the amount of allowance depended of course upon the quality of the wheel. There are wheels very soft that would admit of 1-64 and probably 1-32 allowance. There were wheels made of close, dense iron in which the 1-100 part of an inch will give you all the pressure you want. He had this called in question one day by a master mechanic and a general superintendent, and he invited them, with a superintendent of motive power and a division superintendent, to test the thing. He directed them to press the wheels on and to calliper the wheels and axle they were to go on. They gauged it with an allowance of not more than 1-100 part of an inch. The wheel was bored straight and the axle turned straight and the pressure given was 125,000 pounds. Of course there is a difference of opinion as to whether to make a taper fit or a straight fit; but if he were going to risk his life on it, he would do it on a straight fit. On a road where they have no compromise cars a taper fit might do, where the pressure would be inward all the time; but on compromise cars a smart blow on the inside of the wheel in passing rapidly over a frog might loosen the wheel. Certain it is that if a wheel pressed on at a taper gets a blow enough to start it a thousandth part of an inch, it is loose; while with a straight fit it may receive a very severe blow, and if it was not started more than a thousandth part of an inch, it would not do any damage probably. We have a good deal of fitting to do for cars that run over long stretches of road of different gauges, and we have found it necessary to put the minimum pressure at 60,000 pounds and the maximum at 125,000 pounds. Wheels which require less or more than these pressures are taken off and pressed on again. Of course it is not best to put a needless strain on wheels by making the axle a wedge. Any wheel may be burst, and it is nothing against the wheel either. But a wheel with a proper fit will indicate all the pressure you want without any danger of bursting.

Mr. Adams had noticed in the cars of different varieties that he came in contact with, that more or less of them, and perhaps a majority, had an abrupt, square shoulder, perhaps ⅛ or 1-10 of an inch, immediately back of the hub. He asked what was the effect of this shoulder; whether it did not leave the axle weaker than it would to turn the axle straight back?

Mr. Snow expressed the opinion that it would be better with no shoulder whatever. If the shoulder was left there, especially in the case of a rolled axle, vibration of the axle would almost invariably ensue right at that point; perhaps not so much so in a hammered axle. Iron will granulate from vibration, and that is one reason why rolled axles are so much better than hammered, and he believed if they were turned down in the middle they would get better results from rolled axles.

Mr. Garey said that about 18 years ago they had a good many broken axles, and, upon a careful examination, they found very many of them turned with a shoulder at the inner end of the hub, and many of them had a slight check at that shoulder. He then had the axles forged without a shoulder and put them into service, and he had yet to hear of an axle fitted up in that way having broken at that point, which was conclusive proof to him that no axle should be fitted to a wheel with a shoulder on the inner end of the hub.

In reference to the taper of the axle, he put in his vote against it, especially for broad-tread wheels, where they are running over different gauges.

Mr. Chamberlain thought that, after doing our best, 99

wheels out of 100 were bored with a tapered hole, and you put a strain on the outside instead of uniform throughout the wheel. You may take 3-64 taper and press your wheels on at 30 tons pressure, and it takes 70 tons to press them off again. A great many more loose wheels come over the Boston & Albany Railroad that are straight than are taper. They put in last month 18 wheels that were straight, and all broad-tread at that.

At this point of the proceedings Mr. Partridge read reports of the results of the tests applied to old and new axles and wheels at the last meeting.

Mr. Lobdell, son of Mr. George T. Lobdell, of Wilmington, Del., presented a paper written by his father, giving some of the results obtained by him during his experience of forty years as a wheel-maker. He pressed on his wheels at between 30 and 40 tons, and had never been troubled with any complaints of loose wheels. Flange wear, he thought, was produced by several causes, among which were mistakes in gauging and marking the wheels, and differences in the hardness of the chill, though there was less from the latter cause. Fewer accidents were caused by broken wheels than by rails and other railroad material—because, generally, more care is bestowed on their manufacture, or because wheel-makers are better able to test the quality of their product.

His practice had been to break up all wheels that were at all doubtful, preferring to break up hundreds than to risk one. Breakage of wheels was likely to result from inherent defects in the pattern and to reduction in the weight of the wheel in order to reduce the cost of the product. In relation to the chill, his experience in the manufacture of chilled castings had shown that the defects were not due to or confined to iron made of any of the different kinds of iron ores as hematite, magnetic, specular, bog, etc., but rather to the manner in which they had been smelted or to the want of care. He had got perfect wheels of all these ores, and also of mixtures of these kinds of ore. In relation to "blisters" or blotches, all chilled wheels were liable to them, and they have increased lately, and especially under tender-wheels and others of small diameters. They were not due to the character of the iron used, that is, whether it was hematite, specular or some other kind. Although the defect was unsightly it was not dangerous.

At the conclusion of the reading, Mr. Lobdell exhibited some specimens of wheels which had been broken through the blisters on the tread, which showed that it was merely a surface defect, the iron being sound beneath. One of these, he said, made of hematite ore, 28 inch, had run 70,000 miles under a 32 ton engine whose speed was 40 miles an hour.

By request, Professor Thurston now read the result of the tests of the iron submitted at the last meeting, accompanying the reading with practical remarks and suggestions as to the effect upon the iron of the various operations to which it was subjected in the process of manufacture.

MILEAGE OF CAR WHEELS.

The subject of mileage of car wheels being now announced, Mr. Washburne, of Massachusetts, the veteran manufacturer, was called on for his experience, especially with reference to steel wheels. He said that for the last four or five years they had been making wheels of steel, and had not yet been able to get a satisfactory comparative statement between the steel and iron. The iron wheels of all makers vary greatly. The steel wheel, if perfect, he thought, would eventually take the place of iron wheels. He thought the mileage would exceed that of iron wheels about 6 and perhaps 8 to 1, and should average from 250,000 to 300,000 miles, while a chilled wheel had to be a good one that would average 40,000 miles.

Mr. Garey asked how much mileage the steel wheel would have to make to compensate for the difference of cost between it and iron.

Mr. Washburne said a steel wheel that cost $50 would have to run about 100,000 or 125,000 miles to be as cheap as an iron wheel that would run 40,000, but probably the average of the latter would not exceed 30,000 miles. He thought that the steel wheel would run from 100,000 to 150,000 miles without turning, and would stand turning two or three times before being worn out. He had wheels now that had run over 300,000 miles and were still good.

Mr. Adams said that almost all wheel makers claimed, no doubt in good faith, that we run our wheels for 50,000 miles, and railroad companies have assumed that that is a fact; but no railroad company could give the mileage of the wheels. Trains were broken up so much, running from one road to another and running irregularly, that the mileage could not be kept with any positiveness.

Mr. Scoville said that he had 36 cast-iron wheels on the New York Central between Buffalo and Rochester, two of which had run 150,000 miles and two close up to 200,000. The other 32 died out long before. Out of 35 others returned and whose total mileage averaged 48,000 miles, 24 made less than 30,000, while the other 11 ranged from 60,000 to 85,000 miles. He did not think he had ever made any engine wheels that would average 50,000 miles. To increase the mileage, the iron had to be made denser, and when a manufacturer undertook to work every wheel up to 50,000 miles, he believed he had a bad job on his hands. The wheels of which he had spoken were 26 and 28 inches diameter, generally 28; none of them were 33 inches.

Mr. Adams said they found wheels ran very differently, from 8,000 to 80,000 or 90,000 miles. There was about one good wheel to every three bad ones.

Mr. Davenport said it had been supposed to be impossible to keep the mileage of any thing but engines, and not of passenger, baggage, mail and express cars, but the Lake Shore Railroad had found a way of keeping the latter. Each conductor between Buffalo and Chicago made report of what cars he took from the beginning of his trip and what cars he left at the end, and there was no difficulty in this way of obtaining the mileage. This of course renders it easy to keep the mileage of the wheels. The report on that road of the 1st of last April showed that the wheels removed during the preceding six months had averaged over 57,000 miles, and the least average, he believed, was 54,000. These were 33-inch wheels that had service under heavy cars at high speed. It was true that the Lake Shore was not as hard a road as some others. He wanted to say something about iron wheels now, and he had some in mind that had run 200,000 miles and were good yet. He had the means of fixing the data himself. Iron wheels will therefore make big mileage as well as steel wheels. Iron wheels are not exhausted at the end of 40,000 miles. There may be on some roads bad wheels that make poor mileage. He had nothing to say against steel wheels, but he wanted the iron wheels to have a fair chance. Great improvements can be made in them as well as in steel. But it was necessary that the mileage of passenger cars should be kept, and he called on the master car builders to insist that this should be done. For freight, mark the wheels with the date when put on, and when taken off, and knowing about what distance the cars ran in a year, and the time the wheels had been under the car, the mileage could be calculated with approximately accurate results, while that under passenger cars would be positive.

Mr. Snow said they sold their wheels to the Pullman Car Company on a mileage basis of 50,000 miles, receiving credit for wheels that ran over 50,000 miles, and standing the loss for those that failed to make that, and it was a long time since they had had to pay anything below 50,000. He mentioned that merely for the information of those who thought that chilled wheels would not make over 40,000 miles. The lowest average for the last six months was about 59,000. He believed wheel-makers could do much to improve the quality of their wheels by attention to details. He noticed several years ago that the manipulation of the cupolas did not give as good results in sultry weather as in damp. He commenced to turn the base in and run a stream of water on the iron before changing it, and with good results, and he had carried the experiments further by injecting a stream into the cupola which produced the best results of any he had ever tried. His experience was that wheels could be made to give a general average of 60,000 miles. As for mileage records, it would take three or four years to make a complete record of a lot of wheels, because some wheels would run that length of time, and the record could not be completed until they had all worn out.

Mr. Scoville said it might be possible to get a general average of 60,000 miles out of a 33-inch wheel, but he would rather guaranty 40,000.

Referring to the statement that wheels did not make the mileage now that they did years ago, Mr. Lobdell said that years ago a broad-tread wheel was an exception. They were mostly narrow-tread wheels, fitted with from 1/4 to 3/4 of an inch play, allowing the tread to wear all over the surface. Most broad-tread wheels are set to 1/4 of an inch, and he had seen wheels taken out after 50,000 or 60,000 miles run where the edge of the tread hardly had the chill marks taken off.

Mr. Wood said he thought it would be very difficult to ascertain the mileage of a passenger wheel on account of a prevailing custom upon most roads of removing the wheels after they have been a year in passenger service and put them into the freight service. He said he had examined the Lake Shore system of mileage, and bore testimony to its minuteness and accuracy.

Mr. Forney said he had talked with railroad officers about keeping accurate mileage, and they said the cost was so great that it didn't pay; the results would not warrant the expenditure. An Erie officer had told him, for instance, that the cost of keeping the mileage on that road would be about $10,000 a year.

Some opinions having been expressed that the estimate was too high, Mr. Wood was questioned as to the number of clerks employed in this duty on the Lake Shore, and he estimated them at about 15.

Mr. Chamberlain here produced a paper from which he read a record of the mileage of certain lots of wheels: 588 wheels made 19,173,678 miles, or a total average of 32,608; 1.682, 33-inch wheels in the passenger service averaged 35,723 miles. Of 1,800 steel wheels put on, the largest mileage was 320,388 miles and the wheels good from all appearance for as much more. They were running under a guaranty of 100,000 miles, and still in perfect order. Of 72 defective steel wheels, the smallest mileage was 9,300, and the largest 237,000, the average mileage being 79,562 miles. These are under coaches weighing from 20 to 25 tons; a majority 20, and have a run of 200 miles.

At the close of the discussion Mr. Forney moved that the subject for the next meeting be "car framing," and that Prof. De Volson Wood be invited to address them about the theory of the strain on car frames. Carried.

Mr. C. A. Smith requested that the car builders should bring in their plans for framing so that the members might have something tangible before them to talk about.

The Association then adjourned.

Report of the Illinois Railroad Commissioners.

The following summary of the Illinois Commissioners' report is the fullest we have been able to obtain, but seems to omit some important parts, especially with regard to the Commissioners' principles for determining what are "reasonable rates;" the only thing made plain in this regard is that they affirm that the cost of the railroad should not be taken into account:

SUITS AGAINST THE RAILROADS.

As to the suits brought in Stephenson County against the Chicago & Northwestern Railway, and at Urbana against the Illinois Central Company, the report says:

These suits were brought for extortion, in the name of the People, etc., vs. the roads mentioned, and prior to the time fixed by law, to wit, the 15th day of January, 1874, for the schedules of the Commissioners to become prima facie evidence of reasonable maximum rates of charges. It will be borne in mind that the act of May 2, 1873, provides that "whenever facts in any matter ascertained by said Commissioners shall, in their judgment, warrant such prosecution, it shall be the duty of said Commissioners to immediately cause suits to be commenced and prosecuted against any railroad corporation which may violate the provisions of this act."

In the cases mentioned, the law, in the judgment of the Commissioners, had been violated, and although the schedules were not at the time of the bringing of these suits *prima facie* evidence of a reasonable maximum rate of charges, the act of May 2, 1873, was nevertheless, with the exception of this fact, in as full force and effect as at the present time.

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In the case of the People, etc., vs. The Chicago & Northwestern Railway Company, at Freeport, Stephenson County, at the December term, 1873, the defendant pleaded the general issue, and a number of special pleas, setting up in various forms the rights claimed under the charters of the several companies consolidated with defendant's company. A demurrer to the special pleas was sustained, and the defendant elected to stand by its pleas, thus leaving in the case the general issue alone. At this term the case was continued, at the instance of the defendant, to the March term, 1874, and then upon motion of defendant, supported by several affidavits, the case was continued to the September term following, and, lastly, a continuance was agreed upon with a view of awaiting a decision of the Supreme Court of the United States, in which were involved questions bearing upon this case, and for the further reason that a trial of the case in the Circuit court in March, 1875, would not delay the bringing of the case before the Supreme Court of the State at its next term at Ottawa.

In the case of The People against the Illinois Central Railroad Company, at Urbana, Champaign County, a præcipe was filed, and before any other steps were taken the suit was dismissed, the Commissioners preferring to institute suits against said company after the clause in the law making the schedules prepared by them *prima facie* evidence, etc., had taken effect.

On the 5th day of March, 1874, suit was commenced against the Chicago, Burlington & Quincy Railroad Company, in Bureau County, and at the September term of said court judgment was obtained for the people for $1,000. The pleas filed by the plaintiff aver that by charters defendant had power to fix rates prior to suit, and had fixed rates, and that the rates had been published, etc.; that the rates were uniform and fixed in just exercise of powers, and that the rates complained of were the same as the rates fixed. The demurrer was general and special. The general ground was that defendant was limited to a *reasonable* rate; the special ground that pleas were in effect general issue. The court held both well taken, and appeal was taken by the defendant to the Supreme Court at Ottawa. On the 4th day of July, 1874, the Commissioners instituted a second suit against the same railroad company, in the McDonough County Circuit Court, and at the September term following defendants filed their special pleas, substantially the same as in the preceding case, which were demurred to, and demurrer sustained, evidence heard, and judgment given for the people for $1,000 and costs. The case was appealed by defendant to the Supreme Court, where it is pending for hearing at the January term, 1875.

On the 6th day of February last, suit was instituted in the Sangamon Circuit Court against the Chicago and Alton Railroad Company for extortion. At the February term of that court the suit was continued to the May term on affidavits filed by the defendant. Prior to the May term defendant's counsel procured a writ of certiorari to be issued from the Circuit Court of the United States, under the provisions of the act of Congress of April 20, 1871, entitled, "An act to enforce the provisions of the Fourteenth amendment to the Constitution of the United States, and for other purposes" (commonly known as the "Kuklux" act), commanding the transfer of the suit from the State to the Federal court. At the May term the State court, after full argument on the part of each party, declined to obey the mandate of the writ of certiorari, and the defendants refusing to plead or otherwise appear, except as amicus curiæ, the cause was tried and a judgment obtained in favor of the people for $3,000 and costs. Subsequently the defendants obtained a writ of error and supersedeas, by which the cause was taken to the Supreme Court of the State, where it is now pending for hearing at the January term, A. D. 1875.

At the June term of the United States Circuit Court very full arguments were submitted by counsel for the respective parties to the full bench, consisting of Judge David Davis, of the Supreme Court of the United States, and Judges Drummond and Treat, upon the proceedings instituted in the court by the writ of certiorari, and a decision rendered quashing said writ and dismissing the proceedings. From this decision the defendants have taken an appeal to the Supreme Court of the United States, where it is now pending for hearing at the next term. Thus we have the anomaly of the same case pending in the two courts at the same time. On the 2d day of June suit was instituted against the same company in the Sangamon Circuit Court. This suit was brought for extortion; and at the November term of said court the defendant filed an affidavit for continuance; and, after argument, the case was continued until the next term of the Sangamon Circuit Court, to convene the third Monday in February next. And also on the 5th day of October, A. D. 1874, suit was brought against the company in the Madison Circuit Court at Edwardsville. On October 28 a general demurrer was filed, setting forth that the declaration does not aver that the company charged and accepted the illegal rates corruptly. Plaintiff's counsel expect suit to be tried at the coming March term of said court.

In the case of the People vs. The Toledo, Wabash & Western Railway Company, in the Morgan County Circuit Court, a dedimus issued, after due notice on the part of the defendant, to take the depositions of the railroad experts in different parts of the United States, and the cause continued. Attorneys for the people state that they know no reason why the case may not be tried at the next term of the court, which meets the second Monday in May, 1875.

In the early part of last month suit was commenced against the same road in the Macon County Circuit Court. The plaintiff will be ready for trial at the coming term of said court, Dec. 5, 1875.

Suit was instituted also against the Illinois Central Railroad Company, in the Circuit Court of Alexander County, for extortion. The pleadings were settled at the May term, 1874, and the case continued generally. At the September term the cause was continued by the company on affidavits of its officers. The attorneys for the people say they will be ready to try the case at the next term of the court, which meets in January next.

Suit was commenced at the October term of the Douglas County Circuit Court, against the same company, for extortion, and submitted on an agreed statement of the facts. The case was taken under advisement. Negotiations are pending by which it is expected that the judgment will be entered as of the October term, thus making it practicable to bring the case, by appeal, before the Supreme Court at its January term, 1875.

As to the

TRACK SCALES

provisions of the act the Commissioners state:

Early in the year we issued a circular to all the railroad companies in the State, calling their attention to the law requiring "track scales" at all points where 50,000 bushels of bulk grain had been shipped during the previous twelve months. Prompt responses were given, in which was stated a readiness to comply with the law at the stations where the shippers desired such scales. Accompanying these communications were long lists of signatures from shippers on the several railroads, stating that they had no need of "track scales," especially if their use would entail any extra expense. By personal investigation and inquiry of very many of these same parties, we found the testimony almost uniformly the same. In view, then, of the facts given, we have limited the prosecution in these cases to points where complaints are made, and in all such cases have instructed the County Attorney to prosecute under the act mentioned.

Of their

CONFERENCE WITH THE RAILROAD COMMISSIONERS OF IOWA, MINNESOTA AND WISCONSIN,

the Commissioners report:

"We opened a correspondence in July last with the Commissioners of these States, which resulted in a joint conference of the Commissioners of Minnesota, Wisconsin and Illinois at Dubuque, Iowa, on the 12th of August, 1874, and again in September last at Madison, Wis. At these conferences special committees were appointed upon the several questions under consideration, to report at the coming conference, at the conclusion of which, should the result seem to require legislative action, they will be laid before the Governor, in order that, if approved by him, the attention of the Legislature may be invited to the same."

As to legislation limiting railway charges, the report states: "It is unquestionable that railroad corporations may so operate their roads as to prove of incalculable advantage to the State and its people, or they may make them instruments of the grossest oppression and injustice, and that it is a matter of the gravest importance that their relations to the government and the people should be adjusted with the greatest care and circumspection."

STATUS OF THE RAILROAD QUESTION.

Quoting from the report of the Massachusetts Commission they present the following as the status of the question. The State may either:

1. Leave the corporations to the operation of natural laws, chief of which is competition.

2. Fix the tariff of charges upon any and all commodities, and for passengers, by a positive legislative enactment.

3. Provide a tribunal, by commission or otherwise, which shall have supervision of all schedules of rates, and of the general management and operation of all roads. This is practically the method now in operation in this State; or,

4. Let the State own and operate roads, at such rates as shall make them fairly self-sustaining, with which roads all other roads must compete.

Unfortunately, as it seems to us, Illinois pushed the experiment indicated in the first method to the last extreme. Possessed of a soil and climate unsurpassed in excellence by any territory of like extent in the known world, Illinois at once recognized her imperative need that channels of communica-

tion with all parts of the world should be opened in order to the development of her wonderful capacity to produce articles of prime necessity to man. Accordingly, her Legislature and her people offered every encouragement to the building of railroads. Charters were granted to parties seeking them almost upon such terms as they chose to write. Hardly any power of control, save that derived from the common law, was reserved to the people. The most implicit reliance was placed in natural laws, or in competition, to so regulate tariffs of rates for transportation of freight and passengers as to make them just and only fairly remunerative to the owners of the roads. Experience has fully demonstrated the vanity of this reliance.

As to the longer routes, whenever competition was found practicable, combination was found almost inevitable; and as to those numerous points at railroad crossings not liable to be injuriously affected by combination, it was found that the benefits derived from competition were far more than counterbalanced by the most unjust discriminations against all other stations along the lines—by far the most numerous—where the effect of the competition could not be relied upon.

ILLINOIS LEGISLATION ON THE SUBJECT.

The legislation of 1871 was practically an attempt to obtain relief by the second method above indicated. A full statement of the operations of this board under the law then enacted will be found in the annual report of 1873 to your Excellency. It is sufficient here to state that a test case was made in the courts under the law, and in the end the law declared unconstitutional by the Supreme Court of the State.

The practical effect of this decision is found in the law of 1873, which is now in force, and which, although it may be found susceptible of improvement in some of its minor features, is believed to be based on principles which will stand every legal test, and will, in the end, effectually correct the enormous evils against which it is aimed. By this law every species of extortion and unjust discrimination is prohibited.

* * * * * *

The novel feature of the law, as to unjust discriminations, is found in the fact that the commission of any of the acts specified in the law is to "be deemed and taken, as against such railroad corporation, as prima facie evidence of the unjust discriminations prohibited by the provisions of the act," and as to extortion, the preparation by the Commissioners of schedules of rates of charges for the transportation of passengers and freights, which schedules are to be received in courts as prima facie evidence that the rates therein named are reasonable. It will be observed that in any legal proceedings against any road corporation, for a violation of this act, upon proof of the commission by the defendant of an act declared by the law to be prima facie and unjust discrimination, or upon proof that the defendant had charged a higher rate than that named in the schedule prepared by the commission, the burden of proof is shifted from the plaintiff to the defendant, and that thenceforth the onus of proving that the act complained of, if it be unjust discrimination, was done under such circumstances as to deprive it of its prima facie features of injustice; or, if the suit be for extortion, that the rate charged was reasonable.

The necessity for this change in the rules of evidence is so manifest that it need but be mentioned to be appreciated. In any proceeding by the people against any railway corporation for a violation of law, to require the plaintiff to prove that the act complained of was an unjust discrimination, or that the rate charged for transportation was unreasonable, would be to require proof extremely difficult of access, and in very many cases not obtainable by the plaintiff while peculiarly in the possession and control of the defendant. If a private individual were the plaintiff, the difficulty would be almost insurmountable, and in many instances amount to a denial of a remedy. Thus far, then, the change is not unreasonable, nor does it impose upon the defendant any onerous burden. The corporations can at all times explain all the circumstances under which a charge for freight, or for the transportation of a passenger, was made, or an act committed which is claimed to be an unjust discrimination.

It will be observed that this law in no respect abridges any right vested by charter in the corporations. In other words, conceding that their charters are in the nature of contracts with the State, the obligation of the contracts is not impaired. There can be no pretense that their charters ever authorized unjust discrimination or extortion, and the law prohibits nothing else. The same discrimination that might be practiced before the law was enacted may be practiced now, but if the act is questioned, the corporation must show that it was not unjust. They have the same right to make schedules of rates for transporting freights and passengers as before, but if they make them higher than the rates named in the schedules prepared by the Commissioners under the law, they must be ready to show affirmatively that they are reasonable. * *

STATE OWNERSHIP OF RAILROADS.

The fourth method suggested, viz.: roads owned and operated by the State, with which all others must compete, is in our judgment not practicable, if indeed it is advisable, of which we entertain serious doubt. That a railroad owned by the State and economically operated at rates which would make the road self-sustaining, and no more, would greatly reduce the cost of transportation to all those near enough to its line to avail themselves of its use, and would force all roads seeking business from the same territory to an active, if not, indeed, to a disastrous competition, is undoubtedly true. Practically a railroad is of but little value to people living more than fifteen miles from its line. To give to every part of our State the benefit of the competition which this method is intended to create would, therefore, require a State road longitudinally and laterally for every thirty miles of our area. This would require an expenditure of hundreds of millions, and, therefore, is impracticable.

Upon the subject of railway tariffs they report:

"We have admitted that, under certain contingencies, the cost of the construction and equipment of a road, and the expenses incidental to its operation, are a fair basis to determine the amount it ought to earn, and consequently are reliable data on which to construct a schedule of rates of charges which should be reasonable. But we have also shown that as to a majority of the roads comprising our 'system,' these contingencies do not exist; from which it follows that as to our roads, taken as a system, the items named do not afford the data necessary to a correct solution of the question under consideration. The truth is, there are certain maximum charges for transportation which the business of the country can afford to pay, and beyond which it cannot afford to go.

"Whether a road is built, equipped, and operated with the most rigid economy or the wildest and most reckless extravagance, will neither increase nor diminish this maximum. If, by charging these rates, a road cannot be operated at a profit, it is manifest the road has been improvidently built. There is for the business of railroading no more a royal insurance company, guaranteeing a fair return upon any and every investment made therein, than there is for any other business; and if, for a fair and reasonable compensation, a given road cannot afford to transact the business of the community in which it is located, the sooner its owners cut down its nominal value to such figures, or sell it to other parties for such price as will justify its operation at reasonable rates, the better for the community and all concerned.

We conclude, then, that the usual assumption, that the actual cost of a given road must be taken as a part of the data upon which to frame for such a road a schedule of rates, is fallacious, and that the true criterion by which to estimate its value for this purpose is the amount of business it can command. Its true value for this purpose is a sum upon which the total earnings of the road charged at reasonable rates, will yield a fair return after deducting all legitimate expenses. * * *

Fortunately, we have, in the reports the directors of many of our older roads have made from time to time for the use of their stockholders and the public, and in the records kept by our boards of trade and our business men in all parts of the State of the rates paid for transportation, data upon which reasonable rates might even now be ascertained with a good degree of correctness. A set of statistics carefully collected from year to year, with direct reference to their bearing on this subject, will furnish the means of constructing schedules of rates with a still greater degree of accuracy. * * * * *

The suggestions we have made contemplate the ascertainment with the greatest attainable degree of accuracy of the maximum rates which the business of the State will bear under any circumstances. This maximum rate may be properly and reasonably allowed to those roads in the class least favorably located, while for each of the other classes schedules of lesser maximum rates may be prepared, and thus a fair and equitable return be assured to all, and the public served at fair and reasonable prices.

Thus far we have treated the earnings of the railroads in the aggregate. We have purposely passed over a requirement of the question, which is that a reasonable price shall be fixed for transporting a ton of a named commodity—for instance, coal—a given distance, say one mile. We admit, as insisted by all claiming to be railroad experts, that a categorical answer to this question cannot be given. Freights must necessarily be classified. It is worth more to transport some commodities than others. * * * * *

Then there is such an almost infinite diversity in the operations of the various roads of the State. Some derive their incomes mostly from passengers; others almost exclusively from freight. The bulk of the business of some consists almost entirely in the transportation of a single commodity, while others transport the greatest variety, and in quantities, values and bulks of the greatest diversity. Some are so situated that their trains in each direction are loaded to their full capacity, while most of the business of others is done in one direction, thereby requiring the expense of hauling many empty cars on the return trips. The relative amount of the traffic of one road at different seasons of the year, bears no relation to the traffic of another at the same seasons; these and many, very many, other factors enter into the problem, rendering it so complex that we do not believe it possible for human sagacity to solve the question proposed with mathematical exactness.

While, therefore, we do not claim that these suggestions will make the preparation of a perfect schedule of rates practicable, they are respectfully submitted for the consideration of all persons interested in the subject, in the confident belief that although crude and imperfect in detail, they do shadow forth the only method by which a reasonable price for the transportation of a given quantity of a given commodity a specified distance may be reasonably approximated, and the public to some extent relieved from that system of fixing rates now in vogue, which seems to have for its only basis the charging for the transportation of freight and passengers all that can be obtained.

RESULTS AND RECOMMENDATIONS.

In conclusion the Commissioners report:

We now submit a summary of the laws under which it is made more particularly our duty to act, and the results that have grown out of their enactment.

First, then, the salutary provisions governing the present system of State inspection have met with very general favor, and we think deservedly. The effect of the law has been to reduce very materially the rates of inspection, and to correct many evils and irregularities connected with the inspection of grain that existed in a greater degree prior to its enactment, and it will still be more potent for good should the Supreme Court of the United States sustain the decision recently made by the Supreme Court of this State, declaring the law constitutional and requiring the warehousemen to take out licenses and file bonds conditioned for the faithful performances of their duties.

The present official Warehouse Registrar, Mr. Tyndale, says, in his report made to this board, that:

"There never has been any great difficulty in keeping an exact account of all grain received and a complete check upon the receipts issued therefor; and for a fraudulent or fictitious warehouse receipt to be on the market here is simply an impossibility, all statements of occasional alarms to the contrary notwithstanding. There is no such thing in existence as a fraudulent warehouse receipt, and cannot be. The rule now in force in regard to registration is that no receipt can be registered except upon the report of the inspector or receiving clerk who saw the grain go into store, and examined the weighmaster's ticket for it; or some equally reliable information."

The act of May 2, 1873, known as the present railroad law, was framed, as we have stated in a former report, "in accordance with the suggestions of the Supreme Court, and the charging more for transportation to an intervening or non-competing place than is charged for transportation for a greater distance, and the other discriminations of a like character, specified in the third section of the act of 1873, are thereby made *prima facie* evidence of unjust discriminations."

The framers of this law evidently had in view the requirements of the common law. For when the act of May 2, 1873, says that the corporation shall not unjustly discriminate in their rates of charges, it only forbids that which the corporations themselves admit that they never had a right to do. The same is true of extortionate rates, for at no time since the existence of railroads have they had the right to charge extortionate rates.

The act of 1873 leaves it, too, with the railroad companies to fix their own rates and charges, subject, however, to this difference, when there is any conflict of opinion as to the reasonableness of their rates and charges, then this law makes the schedule of rates prepared by the Commissioners (not absolute) but prima facie evidence of a reasonable maximum rate of charges.

Again, if these rates of the Commissioners, which it is made by law their duty to change and revise as often as the necessities of the case require, are controverted by the corporations, then all the facts in the case go to the courts and juries of the country, and if the schedules of the Commissioners are shown to be at fault, the courts and juries themselves fix the rates.

We conclude, then, that the resistance to this law, on the part of the corporations grows out of the fact that under municipal regulations, and because of the insufficiency of the common law remedies (they having been tried and found to be inadequate), a Commissioner is appointed to stand between them and the public, with powers conferred by the sovereignty that places them on a more equal footing with the mammoth corporations of the State than would be an ordinary shipper, of limited means, who, however anxious he might be to institute suit for grievances, would be deterred from so doing by the contemplation of the pecuniary power of the corporations to resist it, and by reason of continuances, change of venue, attendance at court, counsel fees, a vast amount of evidence to be collected, and finally an appeal to the courts of last resort, when a failure to obtain judgment would probably ruin him.

The benefits resulting to the public thus far from the passage of the act of May 2, 1873, are particularly noticeable in that the railroad companies very seldom now, as heretofore they were in the constant habit of doing, unjustly discriminate in favor of one point on the line of their road to the detriment of another, nor do they practice to the same extent as formerly that objectionable sort of favoritism to individual shippers that has been in the past the cause of so much complaint, and were doubtless among the principal, if not indeed the prime, causes of the enactment. While this law has not as yet accomplished a full reformation as to extortion, we think it may safely be claimed that it has in a great measure put an end to unjust discrimination. It is gratifying to observe also that several of the roads have regulated their charges to correspond, if not exactly, very nearly, with that of the rates fixed in the schedules of the Commissioners; and that the aggregate charges of all the roads in the State, taken upon the same amount of business done is less than before the passage of the law mentioned. In the suits already named, instituted chiefly for the purpose of testing the questions in dispute, it will be observed that in every instance where the courts have passed upon the question, the law has been sustained.

Transportation in Congress.

In the Senate on the 16th:

Mr. Scott, of Pennsylvania, reported favorably on the bill for the relief of the Allegheny Valley Railroad Company, and it was passed. It provided for the payment to it of sums due for mail service some years ago.

Mr. Johnston, of West Virginia, introduced a bill to aid the Washington, Cincinnati & St. Louis Railroad Company to construct a narrow-gauge railroad from tide-water to St. Louis and Chicago. Referred to the Committee on Railroads.

In the house on the 18th:

Mr. Hurlburt, of Illinois, from the Committee on Railroads, reported a bill chartering the Continental Railroad Company to construct a double-track freight railroad from tide-water within 20 miles of New York to Council Bluffs, with limited rates of freight, and a guarantee of its bonds to the amount of $40,000 per mile. Ordered to be printed and recommitted.

In the Senate on the 21st:

Mr. Thurman, of Ohio, submitted a resolution instructing the Committee on the District of Columbia to inquire whether any legislation is necessary for the protection of street-railroad conductors in the District of Columbia against the regulations of such companies requiring conductors to work an unreasonable number of hours out of the twenty-four. Mr. Thurman said he had received numerous complaints to the effect that conductors were required to work 17 and 18 hours out of 24. The resolution was agreed to.

In the House on the 21st:

Mr. Nesmith, of Oregon, introduced a bill for the construction of the Oregon Central Pacific Railroad and Telegraph. Referred.

The House proceeded to vote on suspending the rules and adopting the resolution offered December 14 by Mr. Holman, of Indiana, as follows:

Resolved, That in the present condition of the financial affairs of the Government no subsidies in money, bonds, public lands, or by the pledge of the public credit, should be granted by Congress to associations or corporations engaged, or preparing to engage, in public or private enterprises; and that all appropriations from the public Treasury ought to be limited at this time to such accounts only as should be imperatively required by the public service.

The House refused to suspend the rules and adopt the resolution by yeas 149, nays 75, not two-thirds in the affirmative, as follows:

YEAS.—Messrs. Adams, Archer, Arthur, Ashe, Atkins, Barber, Barnum, Bass, Beck, Berry, Bradley, Bright, Bromberg, Brown, Beckner, Buffinton, Burchard, Burleigh, Burrows, Cain, Cannon, Cason, Chittenden, Clark, of New Jersey, Clark of Missouri, Clarke of New York, Clayton, Cobb, of Kansas, Coburn, Conger, Cook, Corwin, Crofton, Cox, Crittenden, Crooke, Crossland, Curtis, Danford, Dawes, Dobbins, Donvan, Durham, Eames, Field, Finch, Foster, Freeman, Frye, Garfield, Geddings, Glover, Guncke, Gunter, Hale of Maine, Hamilton, Harris of Massachusetts, Harrison, Hatcher, Hawley, of Illinois, Hawley, of Connecticut, Hazelton, of Wisconsin, Hewson, Holman, Hoskins, Hunter, Kasson, Kellogg, Lamar, Laurison, Lamport, Lawrence, Lawson, Lowe, Luttrell, Lynch, McGee, Marshall, Martin, McCrary, McDill, of Iowa, McCongall, McNulta, Merriam, Milligen, Mitchell, Monroe, Morrison, Neal, Niblack, O'Brien, Orr, Orth, Packard, Page, Parker of Missouri, Pendleton, Perry, Phelps, Phillips, Pierce, Pike, Rath of New York, Poland, Pratt, Rainey, Randall, Read, Robbins, E. H. Roberts of New York, W. H. Roberts of New York, Robinson of Illinois, Robinson of Ohio, Sayler of Indiana, Sayler of Ohio, Schumaker, Scofield, Scudder of New York, Shanks, Sherwood, Shoemaker, Small, Smith of Pennsylvania, Smith of New York, Smith of Ohio, Speer, Sprague, Starkweather, Swain, Thomas of North Carolina, Thornburgh, Todd, Tremain, Tyner, Waldron, Ward of Illinois, Ward of New Jersey, Wheeler, Whitehouse, Whitthorne, Willard of Vermont, Willard of Michigan, Williams of Wisconsin, Williams of Michigan, Wilson of Indiana, Wilson of Iowa, Wilson of Maryland, Wolfe, Woodworth —149.

NAYS.—Messrs. Averill, Biery, Blount, Bowen, Butler of Massachusetts, Butler of Tennessee, Caldwell, Cessna, Comings, Creamer, Crouse, Crutchfield, Durrill, Hagans, Hancock, Harris of Georgia, Harris of Virginia, Havens, Hays, Hazelton of New Jersey, Heteford, Hodges, Houghton, Howe, Hubbell, Hyde, Kelley, Leach, Lewis, Lofland, Lowndes, Maynard, McDill of Wisconsin, McKee, McLean, Mills, Moore, Morey, Negley, Nesmith, Nunn, O'Neill, Pelham, Platt of Virginia, Ransier, Richmond, Rusk, Sawyer, Schell, Sener, Sheats, Sheldon, Sloan, Smith of Virginia, Snyder, Stanard, Stephens, Stone, Stowell, Strait, Thomas of Virginia, Townsend, Vance, Waddell, Wallace, Walls, Wells, White, Whitehead, Whitely, Williams of Massachusetts, Williams of Indiana, Willie, Young of Kentucky, Young of Georgia—75.

Rail Mills in England.

Ryland's Iron Trade Circular of Dec. 5, says: "There has been no relief given during the past week to the depression which we have had to chronicle for some time past in the rail mills of Cleveland and South Wales. It is said that Mr. Crawshay is about to start the Cyfartha Works, which have had a long period of idleness, and whose men have had to endure so much distress; but the iron trade in South Wales is in a bad way, the masters being unable to transact business at prices now offered by consumers, and this means another reduction in wages. In the North of England all the rail mills on the Tees side, with two exceptions, are idle, and thousands of men, women, and children are on the verge of starvation."

Generosity of Directors.

The Manchester *Free Lance* says: "Complaints having been made of the very insufficient light in the carriages on the Bourden line, the directors, with their usual enterprise, have decided to allow passengers to carry their own lanterns."

—Hon. James H. Howe has resigned his position as Judge of the United States District Court for the Eastern District of Wisconsin on account of ill health. His resignation takes effect January 1. Previously to his appointment as Judge, which office he has held only about a year, Judge Howe was for some time General Manager, and before that Solicitor, of the Chicago & Northwestern.

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S. WRIGHT DUNNING AND M. N. FORNEY.

CONTENTS

	Page		Page.
ILLUSTRATIONS:		The Scrap Heap	506
Steam Pipes for Double-Truck Locomotives	501	Old and New Roads	507
Movement of Cross-Heads	506	MISCELLANEOUS:	
Water Gauge for Tender	509	Monthly Meeting of the Master Car Builders' Association	501
CONTRIBUTIONS:		Report of the Illinois Railroad Commissioners	502
The Movement of Locomotive Cross-Heads	506	Transportation in Congress	503
Fuel Consumption and Slide Valves	506	Master Mechanics' Association—Circulars of Inquiry	508
EDITORIALS:		British Board of Trade, Rules for Working Single Track Roads	509
The Value of Fuel	504	Locomotive Runners	509
The Year	505	Proposed Railroad Postal Service Law in Germany	510
Record of New Railroad Construction	505	Massachusetts Railroads	510
EDITORIAL NOTES	505		
GENERAL RAILROAD NEWS:			
Traffic and Earnings	506		
Elections and Appointments	506		
Personal	506		

Editorial Announcements.

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

THE VALUE OF FUEL.

In another column we publish a communication from a respondent to the invitation of Mr. Wilson for comparisons of performance of locomotives. There are two great difficulties in the way of drawing any deductions of value from such comparisons. The first, that of knowing the amount of "work" done in hauling a car over any road named, on which we have commented heretofore, and which will not be discussed at present. The other difficulty, to which we propose giving a little consideration here, is that of knowing the heat-producing value, or rather the steam-producing capacity of any given kind of fuel. In doing this a resume of the chemical constitution of coal, and the chemical and thermodynamic principles involved in combustion, may not be inappropriate.

The principal constituents of coal are carbon, hydrogen, water, a little sulphur, ashes and clinker, the latter two substances consisting generally of silica, alumina, iron, lime, magnesia and oxide of manganese. The principal combustible constituent of anthracite is fixed, uncombined carbon. The free-burning or semi-bituminous coals contain a considerable amount of hydro-carbon or volatile combustible matter, and bituminous caking coals have a larger percentage of volatile combustible.

If a mass of coal is brought to a sufficiently high temperature (probably something above 1,000° Fahrenheit) the combustible materials enter into chemical combination, and as much heat is given out as would be required to decompose the resulting products into their elements. Numerous experiments have been made in regard to the amount of heat produced by the combustion of various elements. The results most generally accepted are those of MM. Favre and Silbermann, because their figures are somewhat higher than those of other experimenters, and with careful tests the most obvious error would be that arising from loss of heat by radiation or conduction. The heat produced by the combustion of a substance is ordinarily measured, in this country, in British thermal units, so that the expression for the heating power of a combustible shows the number of pounds of water of maximum density that would be raised one degree in temperature, if the full effect of the combustion were realized. When coal is burned the water is first expelled; then the sulphur, if any is contained, is consumed, forming sulphurous oxide; after this the hydrogen in the volatile combustible matter unites with oxygen, forming water; and the carbon set free unites with oxygen, forming carbonic di-oxide, if the temperature is sufficiently high and enough oxygen is present, or, under less favorable circumstances, either forming carbonic oxide, or passing off unconsumed, as soot. The combustion of the fixed carbon next begins, the product of the combustion being carbonic di-oxide or carbonic oxide, as has been explained in the "Catechism of the Locomotive," so that finally nothing is left except the ashes and clinker.

It may be well to trace the effect of these various combinations: The water contained in the coal is expelled in the form of steam, so that it carries off some heat, and is a positive disadvantage. The complete combustion of a pound of sulphur produces about 4,000 units of heat, but the amount of sulphur in coal is usually so slight that its heating qualities scarcely deserve to be regarded. The action of the sulphur on the material of the boiler is, however, a very serious matter. It has not yet been determined by experiment what per cent. of sulphur is sufficient to render a coal unfit for use in a furnace, but it is well known that many of the Western coals produce very bad effects when employed in locomotive boilers. A pound of hydrogen combining with oxygen, forming 9 pounds of water, has a heating power of 62,032 units. It seems doubtful, however, whether this amount of heat is available from the combustion of hydrogen in a boiler. The experiments by which this value was determined were made upon hydrogen in the gaseous state, and the steam resulting from the combustion was condensed. Now the hydrogen in coal is ordinarily combined with carbon, and frequently with nitrogen, so that it must be separated from the combination before it can be united with oxygen, and heat is required for this separation. Again, in a boiler the products of combustion usually pass into the chimney at such a high temperature that the water, which is the result of the combustion of the hydrogen, passes off in the form of steam, and thus carries off a considerable quantity of what is commonly known as latent heat. This subject is one which has been but little considered by experimenters, and is worthy of more extended investigation. The volatile combustible matter of coal generally contains oxygen in combination, and this must be changed into the gaseous state before being united with the hydrogen, an operation that requires as much heat as results from the new combination. Hence it is certain that the amount of hydrogen contained in coal must be diminished by one-eighth of the weight of the oxygen before attempting to form any estimate of its heating qualities, and the preceding remarks show that the data for making this estimate are far from complete. More evidence on this point will be given subsequently. The carbon of the coal, as has been already stated, will unite with oxygen, forming carbonic di-oxide, and may afterwards take up more carbon, and be converted into carbonic oxide. Now the result of the complete combustion of a pound of carbon is $3\frac{2}{3}$ pounds of carbonic di-oxide, and the combustion produces 14,500 units of heat. But a pound of carbon imperfectly burned produces $2\frac{1}{3}$ pounds of carbonic oxide, and only 4,400 units of heat. In a furnace where the combustion is imperfect, the action is usually as follows: A pound of carbon is at first completely burned, forming $3\frac{2}{3}$ pounds of carbonic di-oxide, and then takes up another pound of carbon, producing $4\frac{2}{3}$ pounds of carbonic oxide and 8,800 units of heat. This carbonic oxide, however, if supplied with a sufficient amount of air, will burn and again form carbonic di-oxide, so that the full effect of the combustion of the carbon will be realized. A practical application of this principle is seen in the combustion chambers in boilers, which are designed to complete the combustion of the gases after they leave the furnace.

Having disposed of the materials of the coal which escape into the chimney of a boiler, the ashes and clinker that remain should be considered. The effect of these substances is injurious in several ways: they choke up the furnace, preventing free access of the air to the combustible materials, and instead of entering into combinations and producing heat, they require to be heated to the temperature of the furnace, and are then removed, without having produced any equivalent for the heat expended upon them.

It will be seen that in the combustion of coal the only heating effect that can be calculated with certainty is that produced by the combustion of the carbon. Prof. Walter R. Johnson, in a "Report to the Navy Department on American Coals," in 1844, gives some illustrations that would seem to point to the conclusion that the heating power of coal is directly proportional to the amount of carbon that it contains, or that, as expressed in the report, "the weight of carbon alone in coal is the only available element of its heating power." He does not state this as a well-settled fact, since the number of specimens of coal submitted to ultimate analysis was quite small; but even these few examples show that there is little probability of the calculation of the heating power from the hydrogen and carbon being correct. The results derived from the ultimate analysis of four samples of American bituminous coal are given in the first of the following tables:

ANALYSIS OF FOUR KINDS OF AMERICAN COAL.

KIND OF COAL.		COMPOSITION BY WEIGHT, IN 100 PARTS.	UNITS OF HEAT.	RATIO.
From Cambria County, Penn.	0.700	Moisture.		
From Clover Hill Mines, Appomattox River, Virginia.	1.500	Sulphur.		
Screened Coal from Midlothian Co.'s new shaft, Virginia.	15.367	Ashes.		
From Caseyville, Kentucky.	76.508	Carbon.		
	4.837	Hydrogen.		
	1.795	Oxygen.		
0.763	11.886	From one pound of combustible (by experiment).		
0.514	13.333	From carbon in one pound of combustible (by calculation).		
4.376	18.044	From carbon and hydrogen in one pound of combustible (by calculation.)		
0.87	0.89	Of experimental result to result calculated from carbon.		
0.69	0.66	Of experimental result to result calculated from carbon and hydrogen.		

PROFESSOR JOHNSON'S EXPERIMENTS WITH FUELS.

KIND OF COAL.	PER CENTAGE.	
Anthracite from Pennsylvania	0.062	Sulphur.
Semi-bituminous from Maryland	88.543	Fixed carbon.
Semi-bituminous from Pennsylvania	3.981	Volatile combustible matter.
Bituminous caking coal from Virginia	0.714	Sulphur.
Bituminous from Nova Scotia	73.963	Fixed carbon.
Bituminous from Great Britain	14.198	Volatile combustible matter.
Bituminous from Canton, Indiana	0.722	Sulphur.
Dry pine wood	73.469	Fixed carbon.
	16 019	Volatile combustible matter.
	0.321	Sulphur.
	58.669	Fixed carbon.
	38.007	Volatile combustible matter.
	0.769	Sulphur.
	61.762	Fixed carbon.
	25.616	Volatile combustible matter.
	1.232	Sulphur.
	58.104	Fixed carbon.
	29.432	Volatile combustible matter.
	53.30	Weight, in pounds, per cubic foot.
	3.34	Time, in hours, required to bring boiler to steady action.
	53.2	Pounds of unburnt coke in the grate, after trial.
	9.55	Pounds of water evaporated, from and at 212°, by one pound of fuel.
	509.9	Pounds of water evaporated, from and at 212°, by one cubic foot of fuel.
	10.47	Pounds of water evaporated, from and at 212°, by one pound of combustible.
	8.54	Per cent. of waste, in clinker and ashes.
	1.70	Per cent. of clinker.
	532.3	Greatest number of pounds of water evaporated, from and at 212°, by one cubic foot of coal.
	14.44	Greatest number of cubic feet of water evaporated per hour, from and at 212°.
	1.000	Relative weights.
	.150	Relative rapidity of ignition.
	.096	Relative completeness of combustion.
	.957	Relative evaporative power for equal weights.
	.960	Relative evaporative power for equal bulks.
	.945	Relative evaporative power for equal weights of combustible.
	.593	Relative freedom from ashes and clinker.
	.965	Relative freedom from clinker.
	.984	Relative maximum evaporative power.
	.894	Relative maximum rapidity of action.
21.00	47.66	49.93	50.08	49.27	53.55	53.14	53.30		
	0.50	0.89	0.99	1.39	1.34	1.25	3.34		
	6.4	9.2	5.1	13.0	27.6	16.0	53.2		
4.69	7.34	7.82	8.29	9.52	9.43	9.98	9.55	509.9	
98.6	348.8	389.6	415.8	414.6	493.9	530.1	509.9		
4.71	7.73	8.36	9.29	9.52	10.71	11.06	10.47		
	5.12	6.94	10.48	10.95	11.84	10.71	8.54		
	1.64	3.54	4.66	5.39	3.10	3.13	1.70		
98.6	360.0	411.4	430.9	433.1	509.1	541.0	532.3		
	15.55	16.34	15.76	14.93	15.82	15.20	14.44		
.403	.894	.937	.940	.924	.986	.997	1.000		
	1.000	.562	.505	.360	.373	.400	.150		
	.797	.698	1.000	.392	.185	.319	.096		
.470	.735	.764	.831	.964	.945	1.000	.957		
.186	.658	.783	.784	.783	.939	1.000	.960		
.425	.698	.756	.838	.859	.967	1.000	.945		
	1.000	.738	.487	.469	.432	.478	.593		
	1.000	.463	.387	.304	.529	.591	.965		
.182	.605	.760	.796	.801	.941	1.000	.984		
	.372	1.000	.966	.914	.966	.980	.894		

The record of the experiments by Professor Johnson

contains the principal part of what is known in regard to the qualities of the coals of this country. The kinds tested consisted of eight anthracites from Pennsylvania, twelve semi-bituminous from Maryland and Pennsylvania, twelve bituminous caking coals from the eastern part of Virginia, six foreign bituminous coals, one sample of Western bituminous, together with some dry pine wood. The second table has been prepared from Professor Johnson's report, giving average values for the different qualities mentioned:

The most of the coals tested by Professor Johnson were sent directly from the mines, and it is probable that a better quality was forwarded than is usually delivered to consumers, since some coals at the navy yard, where the experiments were made, from the same mines from which samples were sent, on being tested gave an efficiency somewhat less than those forwarded directly from the mines. This would indicate that in tests of coal it is best to take the samples from the stock of the consumer, or at least not to order them from the mines explicitly for test. It may be added that a thorough test of American coals is much needed, and would be of great value to railroad men. The test should embrace an analysis of the fuel, the circumstances attending its combustion, such as the temperature of the furnace, and the temperatures of ignition of the various substances, and the maximum heating effect that could be realized from the combustion of each—in addition to the weight of water evaporated, the temperature of the gases in various parts of the boiler, and the amount and character of the products escaping into the chimney. A series of experiments like this would of course be very costly, but if the expense were divided up among the different railroad companies, the proportion borne by each would be comparatively slight, and the advantages resulting from the investment would be very great. As the Mechanical Laboratory under the supervision of the Trustees of the Stevens Institute is now in successful operation, experiments of this kind could not be entrusted to better men than the managers of this Laboratory, and it might be advisable for railroad officials to consider the propriety of having the work prosecuted. In connection with such experiments, various other important points could readily be determined, such as the best proportions and arrangement of heating and grate surfaces, combustion chamber, and chimney. A thorough knowledge in regard to these particulars is quite as important as an understanding of the qualities of the fuel employed, since good fuel, with poor appliances for its use, will be of little advantage to a company; and when the only fuel that can be obtained is of an inferior quality, it is very desirable to know how it can best be utilized.

THE YEAR.

Looking back over the year 1874, now close to its end, we see that while it has been a season of great general depression of business, railroad business has suffered especially—more perhaps than any other great industry except iron. Indeed, one would hardly have believed that transportation, one of the indispensable steps in production, could be so affected by anything less than a great destruction of industries, such as sometimes results from a war. It is very true that transportation is an industry which cannot be suspended, any more than flour-grinding or bread-baking, and under almost any conceivable circumstances it must be a prominent industry in a civilized community; and during the past year there has been an enormous amount of transportation, not a few railroads having a larger traffic than ever before, and the aggregate of the country being probably as large as ever before, except during the one or two years preceding; but a great business is not always a prosperous business, as this year's railroad traffic has very well shown. A railroad company once being put in condition to do a certain traffic lessens its expenses very little comparatively when that traffic is reduced one-fourth. If it has to pay interest to the amount of $2,000 per mile, there is no reduction in this though the traffic fall off ever so much, and generally the expenses which fall off with the business are but a small proportion of the whole. To add to the affliction of reduced traffic we usually have reduced rates in hard times. Try as hard as they may, the railroad companies cannot enforce high rates, usually not rates as high as before; simply because the suffering business of the country cannot bear such rates. If the railroad makes a rate such as would be profitable to it, the coal and the ores are not mined, the iron is not made, the grain remains in store or takes the slow and cheap water route in short, the railroad, though it makes unsatisfactory earnings by carrying all the traffic possible at low rates, cannot do so well even by higher rates: it is a question of doing ill or worse, and the wise companies which have a liberty of choice properly choose to do ill. The trunk lines this year have been carrying a heavy traffic at very low rates; the frontier and branch lines have many of them carried a very small traffic for the best rates they could get, high rates, sometimes, and many of them have found it hard to live through the year, and not a few have not survived it solvent. Railroad traffic as a whole is a pretty good index of the general business of the country, because it is affected with it. We cannot judge from separate lines, as a prostration of iron industry may almost put an end to the traffic of one line, and in seasons of the greatest depression there may be an actual increase of traffic on some isolated line where there has been a great development of industries—perhaps unprofitable ones—or on trunk lines over which flows the collected traffic of whole systems of railroads.

But giving a more extended meaning than transportation to "railroad business," including in it the construction of new railroads, rolling stock, and material, and the trade in railroad supplies, which by themselves form great and important industries, we find the depression much greater than in transportation alone. Railroad construction fell off for the very good reasons that much of the country had too many instead of too few railroads, and people were no longer willing to bury their money in unprofitable works. Still, though we have built this year only about half as many miles as in 1873, and a quarter as many as in 1872, we have yet built a great deal of railroad, more probably than any other country on the globe. Up to this time we have information of the completion of 1,808 miles of new railroad during the year 1873. Last year, after we had got in all our information, we were able to find 3,925 miles of new road, and the year previous 7,340 miles. Our figures for 1874 are not yet complete, but there will probably not be a hundred miles more to add to them, and we may say roughly that in 1873 we built half as many miles as in 1872, in 1874 half as many as in 1873. But after all, 1,800 miles of railroad is a great deal. Incomplete and imperfect as most of the new structures no doubt are, they probably have cost in the aggregate something like $45,000,000, and, as we began the year with 70,650 miles of railroad, the increase has been about 2.6 per cent. which is doubtless quite as great as and probably greater than the increase in population, which is usually at the rate of about 2.85 per cent. per year, and this year has been affected seriously by the great falling off in immigration. We can hardly say that the increase in railroads has kept pace with the increase in production in the country, for there has been a decided decrease in production in many manufacturing industries which has not been compensated by the increase (which has been real and considerable) in agricultural production. Indeed, the general decrease in production is sufficiently proved by the general decrease in traffic.

The new construction of the year has been for the most part the completion or extension of lines begun before. An unusual proportion of it is in short lines for purely local traffic. The longest line completed is that of the Baltimore, Pittsburgh & Chicago, on about 200 miles of which the rails were laid this year. This, too, is doubtless the most important of the new lines, as it opens an entirely independent line from the great center of Northwestern traffic to the seaboard. Its importance has been greatly exaggerated in the newspapers, however, for its significance lies almost entirely in the fact that it makes the Baltimore & Ohio entirely independent in competing for Northwestern traffic to and from Baltimore. It is not so short a route, even to Baltimore, as another many years in operation, and doubtless not so cheap to work; but the independence of the line, the fact that it opens a route whose managers have every reason to cultivate business to Baltimore, and to Baltimore only, is an important fact. The Pennsyvania people can carry to Baltimore as cheaply as any one, but it is a matter of indifference to them whether the traffic goes to Baltimore, Philadelphia or New York, they are equally able to carry it to either place, and are not led by their interests to make a low rate to Baltimore to keep freight from going to other cities. Another of the longer completed lines is the Nashua & Rochester, which opens a pretty direct route between New York and Portland without going through Boston, but will probably not have any great importance as a through line. An extension of some importance is that of the Galveston, Harrisburg & San Antonio, which now approaches most nearly the center of the great cattle district of Texas. Quite a number of mining roads have been built in Utah, and several extensions have been made in California. The Western border States have done very little, as was becoming under the circumstances, but there is one new line in Kansas and one in Minnesota. All, however, are short lines.

The decline in new construction, however, has not been nearly so serious a matter for railroad manufactures as the extreme economy of the roads in operation. Probably the average wear of rails on the railroads of this country is equivalent to ten thousand miles of track—a third more than was ever built new in one year. So of rolling stock and most kinds of materials and supplies, the great consumers are the roads in operation, not those in construction. Now aside from the decreased wear in consequence of the falling off in traffic, the greater falling off in income has made the companies quite generally put off purchase till the last moment, and that moment is often a very late one. With a surplus of rolling stock, it is not necessary to keep up the whole, but when one car or engine is unfit for use, it can be laid up, and another, otherwise idle, put in its place. A least, in one way or another, the railroad companies have succeeded in limiting their consumption of supplies to such an extent that manufacturers and dealers have had a very unsatisfactory business.

The financial aspect of railroads was worst at the beginning of the year. A large number of companies failed to meet the interest on their January coupons. That there were not more failures in the latter half of the year was due largely to the fact that before July most of the weak companies had already failed. The black list is a very long one, and, though there are few additions to it of late, there are scarcely any companies which recover from their embarrassment sufficiently to resume payment. The most striking feature connected with these numerous failures of railroad companies to pay their bonded debts to us seems to be the hesitation of their creditors to foreclose their mortgages. There have been comparatively few foreclosures and reorganizations, but a great many settlements with bondholders on terms proposed by the company.

In the way of railroad legislation, there was in the first part of this year (when the State legislatures were in session), a continuation of the tendency toward restrictive legislation which had been so marked during the two previous years. Iowa, Minnesota and Wisconsin passed laws regulating directly or indirectly the rates to be charged for transportation, and in the latter State they were fixed at a rate which is little more than enough to cover the working expenses of the principal roads. The validity of this law was affirmed in the State Supreme Court and the United States Circuit Court, and the case involving it is now pending in the United States Supreme Court. In Congress the Senate Special Committeee on Transportation presented a long report containing much valuable information and recommendations for the expenditure by the government of two or three hundred millions of dollars for improvements of water routes and canals through the Alleghenies.

In organizations of railroad companies and railroad officers, the most important new thing is the combination aimed at by what is called the "Saratoga agreement," by which the business of fixing and maintaining rates for competitive through traffic is devolved upon two boards of commissioners, appointed by all the companies interested. The Railway Association of America seems to have retired from the field as an organization for pursuing discussions and making agreements between companies, and appears now only as the publisher of a quarterly journal. The Master Mechanics' Association and the Master Car Builders' Association have kept on with their proper work with good success. Besides the technical information contained in their annual reports, we have had the very valuable Report on Rails of a committee of the American Society of Civil Engineers, and discussions of the cost of transportation by Mr. Albert Fink, Mr. Octave Chanute and Mr. L. P. Morehouse.

As for the outlook, these are days when all are looking and hoping for a favorable turn in business, but when most do not calculate on it confidently. The agricultural production of the country has been very large, but prices for some leading staples are unusually low. A revival of manufacturing industries is very much desired, and in some directions it has begun; but the iron industry seems prostrate at present, and this to a great extent limits the product and transportation of coal. Many hope for a fair degree of activity in this industry by spring, and if it does come, there will be reason to think that the conntry is fairly started forward again, and that 1875 will be a much better year than 1874, and the beginning of period of general prosperity, in which railroad business will surely share.

Record of New Railroad Construction.

This number of the RAILROAD GAZETTE has information of the laying of track on new railroads as follows:

Portland & Ogdensburg.—The *Vermont Division* is extended from Hyde Park northwestward 5 miles to Johnson, Vt. *Buffalo & Jamestown.*—Extended from Gowanda southward 5 miles to Dayton, N. Y. *Carolina Central.*—Extended from Monroe northwestward 24 miles to Charlotte, N. C. *Chippewa Falls & Western.*—Extended north by east 7 miles to Chippewa Falls, Wis.

This is a total of 41 miles of new railroad, making 1,808 miles completed in the United States in 1874, against 3,606 miles reported for the same period in 1873 and 7,065 in 1872.

CONGRESSIONAL SUBSIDIES seem hopeless at this session, if there is any virtue in votes. Mr. Holman, of Indiana, offered a resolution last week declaring that in the present state of the country and the exchequer it is unadvisable to subsidize any corporation whatsoever, and when the vote was taken in the House last Monday there were 149 voices for it against 75 against. It requires a two-thirds vote to pass such a resolution, so this failed by just one vote; but on the other hand it takes only a majority to defeat any proposition for a subsidy,

and when two-thirds (lacking one) of the House have recorded themselves as opposed to all subsidies, we may take it for granted that more than one-half of them will be opposed to any particular subsidy. Still, we may make a mistake in taking anything for granted concerning Members of Congress, who sometimes show a contempt for a reputation for consistency, as for some other kinds of reputation; and besides there are more ways than one of "developing the resources of the country" by great public works and immense expenditures of public money. The Government might undertake directly two or three canal tunnels through the Alleghenies, giving employment to a great many contractors and making a brisk demand for rock drills and nitro-glycerine, and of sundry double-track continental railroads. But the vote on this resolution makes it at least improbable, we fear, that we shall all be made rich next year by act of Congress, and we may have to depend upon ourselves, after all. If Congress only would spend about a hundred millions for public works next year, some of us would make a good thing of it. Hard times would be at an end for us, and we would be pretty well prepared to await with complacency the next panic.

Contributions.

The Movement of Locomotive Cross-Heads.

EASTERN KENTUCKY RAILWAY MACHINE SHOPS,
HUNNEWELL, Ky., Nov. 26, 1874.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A question has arisen among us which has awakened considerable interest in the shop and the railroad hands, and I am requested to write to you to obtain your views on it.

The question is this: Does the cross-head on a locomotive work back and forth in the guides the same as on a stationary engine?

To illustrate it a little, I will say that the argument on one side of the question is, that it moves forward and remains at that point and the engine moves forward and the guides come up to it (the cross-head); while the other side contend that it moves back and forth in the guides.

Please give us your views through the RAILROAD GAZETTE.

FRANK E. HOLLIDAY.

[In reply to our correspondent we will say that the cross-head of a locomotive moves continuously in the same direction in which the locomotive itself is moving. The cross-head, however, does not move at a uniform speed, but when the engine is running forward the former advances more slowly during the backward stroke of the piston than during the forward stroke. This is shown clearly in the engraving above, which is supposed to represent the position of the driving-wheel, the crank-pin, wrist-pin on the cross-head, and the connecting-rod, in 16 different positions during one revolution of the wheel. The circle marked 1 represents the driving-wheel in the first position when the crank-pin 1′ is at the forward center or dead-point, and the wrist-pin at 1″. The circle marked 2 represents the position of the driving-wheel when it has made one-sixteenth of a revolution. The crank-pin is then at 2′ and the wrist-pin is at 2″. The line then 2′ 2″ represents the position of the connecting-rod. The circle marked 3 represents the driving-wheel when it has made two-sixteenths of a revolution and the crank-pin is then at 3′ and the wrist-pin at 3″. In the same way the larger circles marked 4, 5, 6, 7, etc., the small circles marked 4′, 5′, 6′, 7′, etc., and the dots 4″, 5″, 6″, 7″, etc., represent the position of the driving-wheel, the crank-pin and the wrist-pin at each sixteenth of a revolution. It will be noticed now from the successive positions 4″, 5″, 6″, 7″, etc., of the wrist-pin, that it has been continually advancing, but it will also be observed that the spaces between these positions during the backward stroke of the piston or from 1″ to 9″ are shorter than during the forward stroke, or from 9″ to 17″, showing that it moved ahead less during each sixteenth of a revolution of the driving-wheel when the piston was moving backward in the cylinder than it did during that part of the revolution when the piston was moving forward in the cylinder, and that the cross-head was moving ahead slower during the former part of the stroke than during the latter. In fact, the intervals between the positions of the crank-pin indicate to the eye the nature of the motion of the wrist-pin, and consequently of the cross-head.

The dotted line *A B C D* shows the path of the crank-pin during one revolution of the wheel. In other words, the curve A B C D is the kind of curve which would be drawn by a pencil placed in the center of the crank-pin if it could touch a smooth surface like a board fence beside the track during one revolution. — EDITOR RAILROAD GAZETTE.]

Fuel Consumption and Slide Valves.

NEW YORK, December 16, 1874.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your impression of December 12 appeared an article showing results obtained by using the "Wilson Slide Valve", and inviting competition.

Now your correspondent does not think it necessary to enter into a competitive trial to show better results than Mr. Wilson claims with the use of his invention, but will give six days' performance of two passenger, also of two freight engines, running out of this city, as taken from the company's books six months previous to date:

Freight.	No. of Engine.	Size of Cylinder.	Miles Run.	Miles per hour.	Average cars per train.	Coal consumed.	Lbs. per car mile.
Freight.....	1	16×22	864	20.6	35	31,802	1.05
"	1	17×24	864	18.0	42.75	45,577	1.23
Passenger....	1	17×24	900	38 5	8	31,975	4 44
"	1	17×20	900	36 5	8	32,160	4.49

I believe that the proportion of travel, lap, etc., with which Mr. Wilson is working his valves is not gaining him as good results as might be had by discarding the present practice and trying one of more recent date. A. G.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—Mr. S. D. Caldwell has been appointed General Western Agent for the White Line, with office in Indianapolis.

—Mr. J. N. McCrea has been appointed Superintendent of the Middle Division of the Pennsylvania Railroad in place of S. A. Black, resigned.

—The Salt Lake *Herald* says that Bishop John Sharp, Superintendent of the Utah Central and Southern roads, has been chosen a director of the Union Pacific Company.

—Mr. C. B. Gerard has resigned his position as Assistant Engineer of the New York Central & Hudson River Railroad, and has been appointed Assistant Engineer on the Sixtieth street Improvement in New York.

—Mr. Frank C. White, formerly of the Harlem Extension, has been appointed Superintendent of the Panama Railroad.

—At a new election of officers of the Fort Worth & Denver City Railroad Company in Fort Worth, Tex., December 6, the following were chosen: President, Col. I. M. Eddy; Vice President, W. H. Lawrence; Treasurer, M. H. Sohle; Secretary, I. Mayer.

—At a meeting held in New Bedford, Mass., last week, the Fall River Railroad Company was permanently organized by electing J. A. Beauvais, President, and Thos. B. Fuller, Clerk and Treasurer.

—The directors of the Pigeon Point & Pescadero Railroad Company, recently organized, are: Josiah P. Ames, James Byrnes, Charles Goodall, Christopher Nelson and John O'Farrell.

—At the annual meeting of the Boston & Maine Railroad Company in Lawrence, Mass., December 9, the old board of directors was re-elected, as follows: George C. Lord, Nathaniel J. Bradlee, John F. Osgood, Boston; Nathaniel G. White, Lawrence, Mass.; James R. Nichols, Haverhill, Mass.; Amos Paul, South Newmarket, N. H.; Wm. S. Stevens, Dover, N. H.; Samuel E. Spring, Portland, Me.; Nathaniel W. Farwell, Lewiston, Me.

—Mr. W. W. Wells, late of the Louisville, Cincinnati & Lexington, has been appointed Train Dispatcher of the Mississippi Division of the New Orleans, St. Louis & Chicago road.

—Mr. J. E. Reeves has been appointed Master of Trains and Superintendent of Telegraph on the Louisville, Cincinnati & Lexington road, and will have charge of the telegraph line and of the movement and disposition of motive power and rolling stock on the road. He succeeds Mr. W. W. Wells, resigned.

—The Senate has confirmed the following promotions in the Corps of Engineers, U. S. A.: Major Thomas L. Casey, to be Lieutenant-Colonel; Capt. Samuel M. Mansfield, to be Major; First Lieuts. A. L. Varney and Henry M. Adams, to be Captains; Second Lieuts. Frank Heath, D. M. Taylor, D. A. Lyle, James Rockwell, W. B. Weir, J. C. Ayers and M. W. Lyons, to be First Lieutenants.

—The New York Supreme Court has appointed Joseph F. Joy Receiver of the old Dutchess & Columbia road, now part of the New York, Boston & Montreal.

TRAFFIC AND EARNINGS.

—Oregon wheat shipments from the opening of the crop year up to November 20, included 27 cargoes, with 24,871 tons of wheat and 44,686 barrels of flour, a total, reducing flour to wheat, of 31,574 tons, or nearly one-third of the available surplus. At the date of the report, 17 vessels with a capacity of 20,000 tons of wheat, were in the Columbia River, loading. Of the 27 cargoes shipped, two went to China, the rest to Great Britain.

—San Francisco wheat shipments for November included 67,885 tons of wheat and 36,600 barrels of flour, a total, reducing flour to wheat, of 73,380 tons of wheat, against 62,740 tons in 1873, an increase of 17 per cent. The wheat all went to Great Britain, with about one-third of the flour; another third of the flour went to Central America, one-sixth to Mauritius, and the rest to China and the Pacific islands. The total shipments for the first five months of the crop year, reducing flour to wheat, were 225,135 tons, 7,504,500 bushels.

—The earnings of the Great Western Railway of Canada for the week ending November 27 were: 1874, £19,641; 1873, £20,257; decrease £616, or 3 per cent.

—The earnings of the Southern Pacific Railroad of California for the year ending June 30, 1874, were:

Earnings ($7,406 per mile)	$1,162,738 33
Expenses (39.8 per cent.)	463,674 34
Net earnings ($4,453 per mile)	$699,063 99

Both earnings and expenses are stated in gold.

—The earnings of the Grand Trunk Railway for the week ending November 28 were: 1874, £44,200; 1873, £44,600; decrease, £400, or ⅞ per cent.

—The earnings of the Denver & Rio Grande Railway for the first week in December were: 1874, $7,403; 1873, $5,024; increase, $2,379, or 47.3 per cent.

—The Canal Commissioners of Illinois report the earnings of the Illinois & Michigan Canal for the season as follows:

	1874.	1873.	Decrease.	P.ct.
Earnings	$153,341 61	$173,520 10	$20,178 49	11⅝
Expenses	73,798 00	81,098 00	7,300 00	9
Net earnings	$79,543 61	$92,422 10	$12,878 49	13⅞

—The earnings of the New York State Canals from the opening of the season up to December 1 were: 1874, $2,634,589; 1873, $2,974,420; decrease, $339,831, or 11⅜ per cent.

—The earnings of the Atlantic & Pacific Railroad for the second week in December were: 1874, $88,600; 1873, $83,658; increase, $4,942, or 5⅞ per cent.

—The earnings of the Michigan Central Railroad for the first week in December were: 1874, $125,620; 1873, $134,425; decrease, $8,805, or 6¼ per cent.

—The earnings of the St. Louis & Southeastern Railway for November were: 1874, $102,608; 1873, $98,248; increase, $4,360, or 4⅜ per cent. For the eleven months ending November 30 the earnings were: 1874, $1,155,842; 1873, $1,198,156; decrease, $42,314, or 3½ per cent.

—The earnings of the Toledo, Wabash & Western Railway for the first week in December were: 1874, $73,413; 1873, $92,694; decrease, $19,281, or 20¾ per cent.

—For the week ending Dec. 12, the receipts of flour and grain at the exporting Atlantic cities were not much different from those of the corresponding week last year, 1¾ less flour, 5 per cent less wheat, 22 per cent more corn and 28 per cent. less oats.

—From Jan. 1 to Dec. 12 the receipts of crude petroleum at Pittsburgh were: 1,469,991 bbls this year against 1,015,247 last, an increase of 45 per cent.; and the shipments of refined petroleum were 858,632 barrels in 1874 and 836,894 in 1873, an increase of 2¾ per cent. The exports for the same period from Boston, New York, Philadelphia and Baltimore were: 222,532,451 gallons this year against 229,749,228 last, a decrease of about 3¼ per cent.

—For the month of November the receipts of coal at East St. Louis were as follows:

	Tons.
Belleville & Southern Illinois	27,956
Illinois & St. Louis	17,478
St. Louis & Southeastern	13,096
Vandalia Line	9,683
Ohio & Mississippi	9,017
Cairo & St. Louis	2,676
Indianapolis & St. Louis	2,664
Total	82,570

The receipts were unusually light, owing to the strikes in the mining districts.

—For the week ending Dec. 12 the grain and flour received at the western lake ports, St. Louis and Peoria, compared with those of the corresponding week of 1873, showed 9 per cent. more flour, 11 per cent. less wheat, 109 per cent. more corn, and 15 per cent. less oats. For the crop year from Aug 1 to Dec. 12, the receipts at these places were 2,321,128 barrels of flour and 65,954.052 bushels of grain of all kinds this year, against 2,431,414 barrels of flour and 81,570,757 bushels of grain for the same period in 1873, showing a decrease of 4⅛ per cent. in flour and 18 per cent. in grain. The shipments from Western lake ports for the week ending Dec. 12 (all by rail, navigation having closed) were about 6 per cent. less in flour and nearly 65 per cent less in grain than for the corresponding week of 1873.

—For the fiscal year ending November 30 the shipments of oil east from Harrisburg, Pa., by the Allentown Line were 15,150 cars, carrying about 42,420,000 gallons.

—The chief lake exports from Buffalo for the season of 1874 were 383,866 tons of coal, 160,852 barrels of cement, 452,350 barrels of salt, 46,116 bars and 1,674 tons of railroad iron. All these together amount to about 480,000 tons of shipments by lake, while the grain received by lake amounted to about 1,700,000 tons.

PERSONAL.

—Mr. Samuel A. Black, for nine years past Superintendent of the Middle Division of the Pennsylvania Railroad, and for some years previously Superintendent of the Eastern Division of the Philadelphia & Erie, having recently resigned, the board of directors have passed resolutions highly complimentary to Mr. Black for the efficiency and integrity of his service.

—It is reported that the presidency of the Cairo & Vincennes Company has been offered to Mr. John Newell, late President of the Illinois Central, and now Vice-President of the Illinois & St. Louis Bridge Company.

—Mr. J. C. Clark, General Manager of the Illinois Central, was slightly injured by an accident to a special train in which he was passing over the Iowa Division, December 18.

THE SCRAP HEAP.

Railroad Manufactures.

The Louisville Bridge & Iron Company has taken a contract for a three-span iron bridge over the Hiwassee River on the East Tennessee, Virginia & Georgia road.

Mr. J. B. Baugh is about to start the largest steam forge in the West. It is to be on the Detroit River about two miles

below the city of Detroit. The heating furnaces are nearly completed and the establishment will soon be ready to start. He will have seven steam hammers, five of which are furnished by Ferris & Miles, of Philadelphia. In connection with the forge there is a machine shop with heavy tools for finishing all kinds of marine and other heavy forgings.

The Pittsburgh & McKeesport Locomotive Works at McKeesport, Pa., is building a second engine for the St. John's Railway in Florida.

Mr. Lewis Scofield, President of the Scofield Rolling mill, in Atlanta, Ga., has patented a new process for making steel-capped rails, and they are now being manufactured in large quantity at that mill. It is claimed that the weld is perfect, that these rails will wear as long as the Bessemer, and that they can be made at a cost only $4 per ton more than iron rails. The steel is made by a new process, and it is claimed that the rails can be re-rolled as easily as iron rails.

Messrs. Weimer & Birkenbine, of Lebanon, Pa., last week concluded a contract for 500 coal cars for the Central Railroad of New Jersey, and will employ a large force all winter.

The Joliet Iron and Steel Company has closed a contract for iron rails for a new road at $56 per ton.

OLD AND NEW ROADS.

Railroads in Mexico.

The *Trait d' Union* of November 30 notes that the Minister of Public Works had communicated to Congress a contract which he had drawn up with Messrs. Camacho, Mendizabal & Co. for the establishment of a railroad between the city of Mexico and that of Leon, in the State of Guanajuato, having a length of about 250 miles, and, connecting, either by the main line or branches, the cities of Queretaro, Celaya, Salamanca, Guanajuato and Toluca if possible. The company is to be called the "Central Railroad Company, Limited." The Government is to pay a subsidy of $9,500 per kilometre ($15,300 per mile), to provide for which it will issue non-interest-bearing bonds to be redeemed by 8 per cent. of the duties collected at Vera Cruz, Tampico, Guaymas, Manzanillo and Mazattan. The company is to complete 31 miles within a year and a half from the publication of the law, and the whole within five years and a half. The Minister assured Congress that this time, if it should approve the contract, a railroad would be really built. It is reported that English capitalists are interested in the project, and it seems probable that the Americans represented by Mr. Plumb will not oppose the granting of this concession, which formed part of their original plan, but will make terms with the new company and try to connect with its road.

About the same time, Mr. James Sullivan, representing the Union Contract Company, of Philadelphia (formerly represented by General Rosecranz), presented to Congress anew its project for a narrow-gauge railroad. *La Revista*, one of the Mexican papers, said that the company would certainly fail, the narrow-gauge being irrevocably condemned in Mexico.

Mr. Plumb, the representative of the International of Texas, according to the *Trait d' Union*, was busily engaged with its affairs and had almost closed a contract with the Executive for a railroad between Laredo (on the Rio Grande, the terminus of the International of Texas) and Leon (northwest of the city of Mexico, and the proposed terminus of the Central Company's road). This paper says that this contract would probably be granted definitely before the close of the present session (Jan. 10, at furthest).

A number of the *Trait d' Union* of Dec. 6 says on these projects:

"Farewell, mad dreams! The Sullivan and Zamarripa projects have been rolled into the dust. As if to recover the time lost in the interminable discussions of the constitutional reforms, Congress, in day before yesterday's session, hurried through the task. It rejected the Zamarripa and Sullivan projects, and approved, at least in its principal features, the contract made between the Executive and the company of Camacho, Mendizabal & Co. It has been announced that the act relative to this latter concession would be sent to the Executive in accordance with the constitutional requirements. While the session was still pending the Minister of Public Works said that the Executive had no suggestion to make. It was announced, consequently, that the final vote on the act would be had at to-morrow's session." At this session the contract was approved by a great majority.

Latest of all, a telegram from Mexico, dated the 16th, says that the President had submitted to Congress the contract made with Mr. Plumb for the line from Leon to Laredo, to connect with the International of Texas, and that action would be taken on it after the recess.

Dividends.

Dividends have been declared by the following companies:

Rome, Watertown & Ogdensburg, 3½ per cent., semi-annual, payable January 15.

Augusta & Savannah (leased to Central, of Georgia), 2½ per cent., semi-annual, payable on demand.

Philadelphia & Reading, 2½ per cent., quarterly, payable January 25.

United New Jersey, 2½ per cent,, quarterly, payable January 20.

Syracuse, Binghamton & New York, 3 per cent., payable January 2.

New York & Long Branch.

The masonry for the Raritan Bridge, including the center pier for the draw-span, is completed and everything is ready for the superstructure. Iron is being landed at South Amboy for the road southeast of the Raritan River.

New York & Oswego Midland.

The tax-collector at Oswego, N. Y., has levied on four passenger coaches and advertised them for sale. He has been notified that the receivers will continue to resist payment of the taxes and will ask the United States Court for an injunction, as in the Middletown case.

Atlantic & Lake Erie.

Work on this road has been suspended for the winter. Most of the road-bed between Fostoria, O., and Toledo is said to be ready for the iron.

Lake Erie, Alliance & Wheeling.

Meetings are to be held and great efforts made to procure additional subscriptions along the line to make up the amount required to enable the directors to let the contract for the construction of the road.

Chicago & Iowa.

The work on the branch line from Rochelle, Ill., to Rockford has been somewhat delayed by the weather, but eight miles of grading are finished, and work is progressing over the deep cuts and on the piling and bridges. The ties are being distributed along the line. The company has now been fully organized under the name of Chicago, Rockford & Northern.

Southern, of Long Island.

A re-survey has been made of the proposed extension from Patchogue, N. Y., east to Moriches.

Kankakee & Mendota.

The Kankakee (Ill.) *Gazette* says:—"Last Sunday night only five miles remained to be graded between Byrns' farm (four miles west of Kankakee) and Gardner, and, with the exception of a mile or two on which the right of way is not yet obtained, this will probably be completed the present week. The right of way is yet to be obtained between Kankakee and Byrns farm. The ties and iron have been contracted for. The Joliet Rolling Mills are to furnish 2,500 tons of rails at $56 per ton, to be delivered by April 1. The distance between Kankakee & Gardner is 25 miles. We are informed that it is not yet decided where the new line will enter Kankakee."

Lake Shore & Michigan Southern.

The extensive yards at Collamer, seven miles east of Cleveland, are now substantially completed, and all through freight now passes through Cleveland without stopping and is transferred at the new yards. Arrangements are now being made to make all the stock transfers in this yard instead of at Painesville as heretofore.

Lexington & Big Sandy.

Suits have been begun in the Kentucky courts by the counties of Fayette, Clarke and Montgomery and the city of Lexington to recover subscriptions of $2,600,000 made to the stock of this company, on account of alleged fraud in procuring the subscriptions.

The Poughkeepsie Bridge Line.

A meeting of merchants and representatives of the various railroads concerned was held in Boston, December 22, to consider the best means of procuring the speedy completion of the line from Boston to the West by way of Poughkeepsie and the Poughkeepsie Bridge.

Intercolonial.

The thorough investigation by Mr. Brydges of the previous management of the Intercolonial road, or at least of the older and completed portion, has made considerable stir in Canada. Mr. Brydges says that much of the large excess of expenses over earnings is due to the manner in which supplies have been purchased. For nearly all the ordinary materials used the prices paid were from 30 to 50 per cent. over those paid for the same articles by the Grand Trunk. Frauds are also alleged to have been found in fuel contracts.

Bucksport & Bangor.

An injunction has been asked for to restrain this company from using the terminus grounds at Bucksport, Me. The petitioner alleges that the company has not paid him for the land taken by it and also that there is some informality in the organization.

Burlington, Cedar Rapids & Minnesota.

Negotiations are in progress for the running of trains from this road to St. Louis using the Chicago, Burlington & Quincy from Burlington to Keokuk, the Mississippi Valley & Western Keokuk to Quincy, the Quincy, Alton & St. Louis and Chicago & Alton from Quincy to St. Louis.

Western, of Alabama.

Heavy T rail is being laid on the 28 miles of road between Opelika, Ala., and Columbus, Ga.

Pennsylvania.

On application of the parties opposed to the stock-yards and slaughter-house on the west side of the Schuylkill in West Philadelphia, the Court of Common Pleas has granted a preliminary injunction stopping the work and an order to show cause why a permanent injunction should not be issued.

Baltimore & Ohio.

The agreement with the Erie to carry freight from Mansfield to Chicago having given rise to reports that this company had consented to sign the Saratoga agreement, a positive denial is published over the signature of Vice-President King.

It is stated that the company has succeeded in securing the Agricultural Hall of the Exposition building for use as a passenger depot at Chicogo and will begin at once to prepare it for its new use.

Northern Central.

The new President, Col. Thomas A. Scott, has been making a careful examination of the financial condition of the company, and also of the terminal arrangements and facilities in Baltimore. Col. Scott states that proposals are under consideration for the erection of a large elevator at the Canton terminus, and that the new board intends to do all that is possible to build up the Baltimore business of the road.

Western Railroad Bureau.

A conference was held in St. Louis, December 18, with the general freight agents of the Chicago & Alton, Toledo, Wabash & Western, Indianapolis & St. Louis, Vandalia Line and St. Louis, Iron Mountain & Southern. The Ohio & Mississippi, though no representative was present, will, it is understood, concur in the action of the meeting. The consultation was had principally with a view of having a clear and distinct understanding between all these roads in reference to maintaining uniform rates between St. Louis and the East. The meeting was harmonious and unanimous in its understanding in reference to these rates. The meeting also discussed the matter of transfer from St. Louis, the cotton rates from Texas and the freight arrangements north of Texas and west of St. Louis.

A meeting of general passenger agents was held in Chicago, December 18. There were representatives from the Michigan Central, Lake Shore & Michigan Southern, Pittsburgh, Fort Wayne & Chicago, Chicago & Northwestern, Chicago, Burlington & Quincy, Chicago, Rock Island & Pacific, Milwaukee & St. Paul, Pittsburgh, Cincinnati & St. Louis roads, and the Kankakee line.

It was announced by the representatives of the eastern lines that a reduction in passenger rates had been determined upon by the management of the roads. The passenger rates which have heretofore been imposed to local points, upon the roads mentioned, have been made up from a basis of 3½ cents per mile. It is now the intention of the railroad companies to make up their passenger tariffs from a three-cent basis, which will make a material reduction in the charges. The present reduction will not affect the through passenger rate to the East, as it applies only to the local traffic of the roads.

Illinois & Michigan Canal.

The Illinois Canal Commissioners have filed their annual report with the Governor. The earnings of the canal show a decrease, as compared with last year, of $20,179, or about 11 per cent. In 1874 the canal was open for navigation 236 days.

Regarding the work on the Copperas Creek lock and dam, the Commissioners state they took formal possession of the improvement, from the United States authorities, September 21. The state has expended on the work thus far $72,496.84; now on hand in the state treasury to the credit of the Illinois River improvement fund, $126.150.96. The Commissioners are required to complete the lock and dam by January 1, 1876, and will ask of the next Legislature an appropriation for this purpose of $65,000, in addition to the revenues of the canal for next year.

Columbus, Chicago & Indiana Central.

At the adjourned meeting of stockholders in New York, December 16, the board of directors presented a recommendation that stockholders pay an assessment of one-fourth of one per cent. to raise a fund to enable the company to commence legal proceedings to assert its rights as against the lessees. This communication was laid over.

Mr. Charles W. Hassler offered resolutions providing for the appointment of a committee of three to examine all the facts connected with the lease of January 22, 1869, to the Pittsburgh, Cincinnati & St. Louis, and the amended lease of February, 1870, and to report which lease is or should be in operation, and what steps are necessary to be taken in order to have a clear understanding in the matter. The resolutions also provided for an adjournment subject to the call of the chair. There was a long discussion, in which Mr. Thos. A. Scott charged that the company had not carried out its agreement to exchange the second mortgage for income bonds, and President Smith replied that it was impossible to do so, as the bondholders would not consent. Mr. Hassler's resolutions were finally adopted, with another providing for a committee of five bondholders to adjust and compromise, if possible, the bonded debt of the company. The officers were instructed to aid both committees, and Col. Scott promised that the Pennsylvania Company would furnish all the information needed.

The committee appointed under Mr. Hassler's resolutions consists of Messrs. C. W. Hassler and Charles Dana of New York and J. P. Thomas of Philadelphia.

Louisville & Nashville.

The conductor and crew of a freight train on this road were recently arrested at Bowling Green, Ky., charged with systematic robbery of the cars under their control. Their method of operations was to remove the hasps from the door, thus not breaking the seal, then to break open the packages, and after taking out a portion of the contents, to nail them up again. These robberies have been going on for months, and being committed in through freight cars, the company has heretofore been unable to fix the guilt definitely.

Central, of Iowa.

The joint committee of first and second-mortgage bondholders has prepared memoranda for a plan of reorganization, a summary of which is as follows:

1. The Farmer's Loan and Trust Company, trustee, to instruct counsel to co-operate in carrying out the plan.

2. The pending bill in the United States Circuit Court to be amended so as to be a simple bill for foreclosure.

3. The company to file an answer admitting default and stating that the preservation of the road requires the use of its whole income for some time to come to be expended in improving and completing the road.

4. The Court to be asked to continue the Receiver in possession and order him to make such application of receipts.

5. First and second-mortgage bondholders to approve this plan and request the trustee to carry it out.

6. The first-mortgage bondholders to fund all interest up to July, 1877, in 6 per cent. first preferred stock, and for three years thereafter to take 6 per cent., currency, interest on their bonds, funding the rest as above, the gold interest being converted into currency at 10 per cent. premium.

7. The second-mortgage bondholders to fund their interest in the same manner in a 7 per cent. second preferred stock.

8. The floating debt creditors and third-mortgage bondholders to take common stock.

9. Present holders of common stock to receive one-third of their present holdings.

10. The several subordinate interests to agree that if by July 15, 1878, the 6 per cent. currency interest provided for is not paid on the first-mortgage bonds, the first-mortgage bondholders shall be allowed to take possession of the property without opposition and all subordinate interests shall be cut off.

Central of Minnesota.

D. J. Cameron and L. Rossiter have begun suit against certain parties interested in the old Minnesota & Northwestern Company for $90,000, balance alleged to be due for work done on the road between Mankato and Wells under an old contract.

Chippewa Falls & Western.

The track is laid to Chippewa Falls, Wis., 12 miles from the junction with the West Wisconsin at Eau Claire. Trains have begun running. The road will be operated for the present by the West Wisconsin Company. It is to be extended hereafter from Eau Claire through the Chippewa Valley to Reedsburg on the Mississippi.

Henderson & Overton.

The contract for the construction of this road has been closed and work is to be begun about January 1. Ward, Dewey & Co., lessees of the Texas Penitentiary are the contractors.

Northern Aroostook.

This company has given legal notice that further legislation will be asked this winter for leave to Bangor and other municipalities to loan their credit for its construction. Also for a charter to construct a branch from Fort Fairfield east to a connection with the New Brunswick Railroad.

Portland & Ogdensburg.

The connecting track, nearly a mile in length, between this road and the Portsmouth, Great Falls & Conway at North Conway, N. H., is completed.

Buffalo & Jamestown.

The track is laid to Dayton, N. Y., five miles south of Gowanda, the late terminus, and 36 miles from Buffalo. Seven miles of the 10 between Dayton and Cherry Creek are graded and work is in progress on the other three. The rails for the entire line to Jamestown have been contracted for and are being rolled at the Union Iron Works in Buffalo.

Gaithersburg Branch.

Two routes have been surveyed for this proposed branch or loop line from Gaithersburg, Md., on the Metropolitan Branch of the Baltimore & Ohio east to the Washington Branch near Hanover Switch. A committee has been appointed to secure the assistance of the Baltimore & Ohio.

Frederick & Pennsylvania Line.

The Frederick (Md.) *Examiner* of recent date says: Mr. John Loats, President of this road, accompanied by Col. Chas. E. Trail, J. Alfred Ritter and James McSherry, directors, visited Philadelphia on Thursday last, where, we understand, they had a conference with the President and directors of the Pennsylvania Railroad concerning the proposed lease of the Frederick & Pennsylvania Line road by that company.

Pittsburgh, Wheeling & Kentucky.

On behalf of a number of creditors, a motion has been made to dissolve the injunction issued some time since, so as to permit the road to be sold under the deed of trust.

Lake Ontario.

The contractor for the masonry of the Genesee River Bridge, John Edwards of New York, is now engaged in driving piles and making the necessary foundations. The stone is nearly all delivered and ready. The draw-span is to be 135 feet long, and the estimated cost of the bridge is $150,000. Work on the grading west of the Genesee is also being pushed forward.

Kent County.

Mr. Jennings Hood, who has leased the road, has taken possession, and trains have begun running again after a suspension of several weeks.

Baltimore & Swann Lake.

At the annual meeting recently it was reported that most of the grading was finished. A short excavation, 1,300 feet of trestling and five small bridges will complete the road ready for the iron. The contractors have failed to carry out their

agreement and have suspended work. The road is about seven miles long, of three-feet gauge and intended for suburban travel.

The stockholders adopted a resolution to the effect that the company should be confined to the construction of the road as originally designed and that any efforts on the part of the management to build a longer road either directly or by combination with other companies would be regarded as hostile to the interests of the stockholders.

Midland of Canada.

The agreement with the bondholders provides that the coupons for three years shall be funded in interest-bearing bonds, and that all the net earnings shall be used in completing and equipping the road. It is expected that these, with the town and Government aid voted, will be sufficient.

New York, Boston & Montreal.

In the foreclosure suit of Frederick Adams, trustee, Judge Tappan of the New York Supreme Court has appointed Joseph F. Joy Receiver of the Dutchess & Columbia road, which was consolidated with the New York, Boston & Montreal some two years ago.

Easton & Amboy.

At 1:30 p. m., December 17, the final heading was blown out of the Musconetcong Tunnel, and there is now an opening clear through the mountain. The work of enlarging the tunnel to the full size is being pushed forward rapidly. It is within a few feet of a mile long, nearly all through solid rock, and there is a long rock cutting at each end. The grading on the western end of the line is well advanced, and by the time the tunnel is fully completed the track can be laid on the whole road. On the line from Perth Amboy to Neshanic, where one track is laid, the contractors are busy preparing the road-bed for the second track.

New Jersey Midland.

Surveys are being made for a branch from Franklin Lake to Crystal Lake, a distance of about four miles. The branch is expected to carry a large quantity of ice in the winter and some pleasure travel in the summer.

Georgia.

In view of the present condition of business, the directors have decided not to declare the usual January dividend.

Occidental & Oriental Steamship Company.

Three steamers, the Belgic, Celtic and Oceanic, are reported to have been chartered from the White Star Steamship Line by this company. These vessels are very large and were built for the route between Liverpool and New York. The refusal of a number of other vessels has been secured in case the business offered should require additions to the fleet. The three steamers taken are to be sent to San Francisco at once to start the new line.

Central of Minnesota.

It is reported that this road, from Mankato to Wells, is to be leased to the Southern Minnesota as soon as the arrangements for reorganizing that company can be completed.

Hudson Tunnel Railroad.

On application of the Delaware, Lackawanna & Western Company, the Chancellor of New Jersey has granted a preliminary injunction stopping the work on the shaft at Hoboken, N. J. Arguments will be heard by the Chancellor, December 28, on an order to make the injunction perpetual.

Georgia Railroad Taxation.

The Fulton County Superior Court has decided that the new tax law is constitutional, except as to the Georgia and Augusta & Savannah roads. An appeal is to be taken to the Supreme Court.

Sale of Southern Railroad Securities.

In Philadelphia, December 16, James A. Freeman & Co., sold for whom it may concern, at the Philadelphia Exchange, the following bonds and shares :

$2,620,000 second mortgage 6 per cent. bonds Atlanta & Richmond Air Line Railway Company, guaranteed by the Richmond & Danville ..... 10 per cent.
20,000 shares preferred 8 per cent. Atlanta & Richmond Air Line, par $100 ..... 7 cents.
14,840 shares Piedmont Railway Company ..... 45 cents.
5,901 Roanoke Valley Railroad, par $100 ..... 25 cents.
1,300 shares Northwestern North Carolina, par $100 ..... 9 cents.

These were probably some of the Southern investments of the Pennsylvania Railroad Company.

Missouri, Kansas & Texas.

In the United States Circuit Court for the Western district of Missouri a bill in equity has been filed by the American Bridge Company of Chicago to enforce a lien growing out of the contract for the building of the bridge over the Missouri at Boonville.

Shenandoah Valley.

The Clarke County (Va.) Circuit Court has given a decision which dissolves the injunction preventing a meeting of the board of directors of this company, and also the voting in the stockholders' meeting of certain stock claimed to be held by the Central Improvement Company. The complaint in the suit also asked that all the contracts made between the two companies for the construction of the road should be set aside. Under the decision of Judge Turner the amount of stock to be voted by the Central Improvement Company is determined to be $1,000,000. The first contract of the Central Improvement Company with the Shenandoah Valley Railroad Company was pronounced to be a valid one. The supplemental contracts, known as No. 2 and No. 3 were set aside.

Brunswick & Albany.

At a meeting of the bondholders of this company in Frankfort, on the 24th of November, the proposition to lease the road described in these columns last week, and known as the "Lackett" proposal, was declared unacceptable by a unanimous vote. The meeting also was unanimous in the opinion that the bondholders (who are now the proprietors in fee of the road) should not be called upon to furnish money for the construction of a bridge at Albany, (the Atlantic & Gulf Company refusing to rent its bridge to it any longer) or for the extension of the road.

Flint & Pere Marquette.

This company has bought a large wharf at Ludington, the lake terminus. The telegraph line over the new part of the road, from Reed City to Ludington, is nearly finished.

Southern Minnesota.

A meeting of bondholders and others interested was to be held in St. Paul, Minn., December 18, for the purpose of reorganizing the company.

Little Rock & Fort Smith.

The bondholders for whose account the road was purchased intend to reorganize the company at once, exchanging their bonds for stock in the new corporation. They have also agreed to advance 5 per cent. of their holdings to cover necessary expenses. A new mortgage will then be put upon the property to provide means for building the 60 miles required to complete the road to Fort Smith.

Messrs. Shattuck, Weld and Ripley, the agents for the bondholders, have made arrangements to build at once 20 miles, which must be finished by April 30, 1875, to prevent forfeiture of the land grant. The contract for this section has been let to J. N. Johnson and J. McCarthy, who are to begin work at once.

The agents are also arranging to investigate the floating debt with a view to some settlement of the same. It has been charged that much of this debt was dishonestly incurred.

Valley, of Virginia.

A committee of the board of directors advertises for proposals for the lease of the 26 miles from Harrisonburg to Staunton. Terms can be ascertained by applying to Robert Garrett, President, Richard Norris, Jr., Wm. Kayser, of Baltimore, and M. G. Harman, of Staunton.

St. Louis & Florissant.

This road is to be sold under the deed of trust January 9. It is graded and bridged from St. Louis to Florissant, 16½ miles, but no iron has been laid on it.

Oil Creek & Allegheny River.

Holders of consolidated mortgage bonds are requested to deposit their bonds with the Fidelity Trust Company in Philadelphia and sign the agreement prepared by the committee.

North Wisconsin.

This company having completed the 40 miles of road required this year, and having had the same accepted by the Governor of Wisconsin, has applied for patents for so much of the St. Croix land grant as is due for that section. Its right, however, is contested by the Madison & Portage Railroad Company and the Farm Mortgage Association, the former claiming that a portion of the grant is due to it for the road from Madison to Portage, and the latter asserting its right to a land grant for a road from Portage to Tomah. These claimants assert that the original grant assigned a part of the lands for a road from Madison by way of Portage to Tomah.

Subsequent dispatches State that the Governor will issue certificates to the North Wisconsin for 40 miles and to the Madison and Portage for 20 miles of completed road accepted by a former governor.

Detroit, Hillsdale & Indiana.

This road is to be sold under foreclosure of mortgage in Ann Arbor, Mich., January 28, by John T. Lawrence, Commissioner appointed by the Michigan Circuit Court. At least 10 per cent. of the purchase money must be paid in cash, but the balance or any part of it may be paid in past-due coupons at their proper ratable value, to be fixed by the Commissioner.

The road is 65 miles long, from Ypsilanti, Mich., west by south to Banker's.

Bondholders who have not joined in the agreement to buy the road are requested to call at the Union Safe Deposit Vaults in Boston to deposit their bonds and sign the agreement before January 15.

Atlanta & Richmond Air Line.

It is stated that the appointment of Mr. J. P. Fisher as Receiver by the United States Circuit Court in the foreclosure suit may lead to a contest between the Federal and State courts, as Col. L. P. Grant has already been appointed Receiver for the Georgia section of the road by the Georgia Circuit Court.

Louisville, New Albany & St. Louis.

The Illinois section of this road (about 18 miles out of 29) with one-half the bridge over the Wabash River was sold under execution at Springfield, Ill., by the United States Marshal, December 16. It was bought by Dewey & Prescott, bridge builders, at whose suit the execution was issued, for $8,000, about the amount of the judgment.

Vermont & Massachusetts.

Surveys are to be made for a loop-line from Wachusett Station, Mass., west by way of Westminster Center to South Gardner. It will be about six miles long, will give a better line than that now in use, and will avoid the trouble of reversing the trains at South Ashburnham.

Maine Central.

It is denied that there is any trouble between this company and the Eastern arising out of the division of earnings. The meetings held recently have had reference to efforts now being made to harmonize the various railroad interests centering at Portland.

A proposition of the Boston & Maine for better connection at Portland has been presented to the Maine Central board and is now under consideration.

There seems to be very little doubt that it is seriously proposed to do away with the present agreement with the Eastern and to substitute a more open contract which will leave room for some alliances with other companies. It is reported that among the Maine Central stockholders there is much dissatisfaction with the workings of the present agreement.

The Hoosac Tunnel Line.

Shanly Brothers, the contractors who completed the tunnel, have closed their connection with it and transferred the work to the Commissioners. What remains to be done, the arching, closing of the shafts and tracklaying, is assumed by the State. The tracklaying was included in the Shanly contract, but the Commissioners preferred that it should not be done until the arching was all finished, and therefore relieved the Shanlys from it, taking the material already provided. The Shanly Brothers have been very successful in their work from an engineering point of view, but it is understood that in complying with the terms of the contract they have suffered considerable pecuniary loss.

North Brookfield Branch.

Arrangements are being made to build a branch line about four miles long, from North Brookfield, Mass., south by east to the Boston & Albany, at East Brookfield Station.

Tyler Tap.

The Engineer, Maj. B. S. Wathen, reports that the whole length of this road, as surveyed, will be 21 miles, from Tyler, Tex., northeast to the Texas & Pacific. The maximum grade is 66 feet to the mile, and that is needed only on four miles. The work is light except for three miles. The crossing of the Sabine will require 240 feet of piling and a bridge 200 feet long. The estimate for the whole line ready for the equipment is $8,000 per mile. It is intended to build the road of standard guage but to use light iron and equipment.

Monterey & Salinas Valley.

This company has brought a test suit against one of the subscribers to the stock who took 250 shares and subsequently failed to pay the assessments on it. The company now seeks to recover the amount of the assessments.

Texas & Pacific.

Work is said to have been resumed on the Trans-continental Division between Brookston, Tex., and Texarkana.

Deerfield River.

This is the name of a proposed narrow-gauge road, for which surveys have been made, and which is to run from Shelburn Falls, Mass., nearly due north to Sherburn, Vt., where it will make a junction with the projected Montpelier & Rutland road, with which it will complete a line from Shelburn Falls to Montpelier. The length of the line from Shelburn Falls to Sherburn is about 70 miles. The projectors have also in view an extension from Montpelier north to the Canada line. The Deerfield River road will pass through a pretty heavily wooded and not very thickly inhabited country, and will be about half-way between the Harlem Extension and the Central Vermont's line, and far enough from both to secure all the local traffic without serious competition.

Pigeon Point & Pescadero.

This company has been organized in San Francisco and has filed its articles of incorporation. It purposes building a narrow-gauge road from Pigeon Point Landing to Pescadero in San Mateo County.

Hollister & Salinas Valley.

Surveys have been made for a narrow-gauge road about 21 miles long from Hollister, Cal., northwest to a junction with the Monterey & Salinas Valley road at Elkhorn Slough near Pajaro. The estimated cost is about $300,000.

Southern Pacific.

Tracklaying has been progressing steadily on the extension of the Anaheim Branch from Las Nietas to Anaheim, and it is expected that trains will run from Los Angeles to Anaheim by New Year's day.

Davenport & St. Paul.

Last week certain parties claiming to own a portion of the right of way south of Delaware, Ia., built a fence across the track and took up the rails, stopping the running of trains. The matter was arranged so far, however, that trains were allowed to pass the same evening under a temporary agreement.

Portland, Dalles & Salt Lake.

A bill passed by the Oregon Legislature grants this company exemption from taxation for 20 years, provided the Oregon section is completed by November 1, 1877. Arrangements have been made to connect with the Utah Northern at Snake River in Idaho.

Pittsburgh, Washington & Baltimore.

A double steam elevator is being put up on the Monongahela River, at Pittsburgh, to transfer oil from barges into the cars of this road. It has a capacity of 3,000 barrels per day and is nearly ready for use.

North Carolina.

Three or four bills are now before the North Carolina Legislature providing for the consolidation with this company of the Atlantic & North Carolina and the Western North Carolina, and the completion of the latter road. There appears to be a majority in favor of consolidation, but so much difference as to details that it is altogether possible that it may go over for another year.

Canada Central

The surveys have been completed from the present terminus at Renfrew, Ont., west to the point chosen for the eastern terminus of the Canada Pacific, 100 miles south of Lake Winnipeg.

Franklin Telegraph.

At a meeting held in Boston, December 16, the stockholders present confirmed the lease of this company's property to the Atlantic & Pacific Telegraph Company by a vote of 5,170 shares to 27. A number of the stockholders are opposed to the lease and have petitioned for the appointment of a receiver.

Kankakee & Mendota.

It is reported that the parties who are grading this road intend to run it northeast from Kankakee far enough to connect with the Baltimore & Ohio's Chicago Division. It is claimed that this would give that line a connection outside of Chicago with all the lines running into that city from the south and southwest.

Montclair.

The agreement which the trustees under the first mortgage request the bondholders to sign provides that the trustees may prove the bonds so deposited before the Court and may use them in payment for the road in case they decide to purchase it at the foreclosure sale. The trustees are authorized by the agreement to make such purchase for account of the subscribing bondholders, who further agree to pay such assessments, not exceeding 12½ per cent. on the face value of their bonds, as may be necessary to complete the payment for the road and for the costs of the suit and the reorganization. The agreement further authorizes the trustees to hold and operate the road until a reorganization can be effected on the basis of a *pro rata* interest to the subscribing bondholders, and such other terms as the trustees may see fit, subject to approval by the subscribing bondholders, or a majority of them, at a meeting to be called by the trustees for that purpose.

It is stated that holders of $350,000 bonds have signed the agreement. This statement, however, has been contradicted by others who say that many of the bondholders decline to sign, thinking that too much is left to the trustees.

The road was sold in Jersey City; December 18, under foreclosure of the second mortgage and was bought by Abram S. Hewitt, trustee, for account of the bondholders, for $3,000, subject to the first mortgage.

Portland & Ogdensburg—Vermont Division.

The extension of five miles, from Hyde Park, Vt., northwest to Johnson, is completed, and trains began running to Johnson December 14.

Carolina Central.

The last rail has been laid on the gap between the Eastern and Western divisions, and trains run from Wilmington through to Charlotte and Buffalo. The gap just completed, from Monroe to Charlotte, was 24 miles long, and the company now has 242 miles of continuous road.

Master Mechanics' Association—Circular of Inquiry.

To the Members of the American Railway Master Mechanics' Association :

Nearly all master mechanics, in order to determine the relative economy of different kinds of locomotives, or of methods of construction, are in the habit of making experiments, the results of which are recorded with more than ordinary care and accuracy. At the last convention of the American Railway Master Mechanics' Association, it was suggested that if these records could be obtained and embodied in the form of a report, the data thus collected and published would have very great value. It was also thought probable that, if the attention of the members of that Association was called to the subject, some of them who have not heretofore made such experiments, might be induced to do so. A Committee was therefore appointed to request members "to make experimental tests to show the performance of locomotives, and to report the results to the Association." This Committee, therefore, desire to receive records of *any* experiments which members have made, or may make, with locomotives, to determine their performance. In order to indicate the kind of information and data desired, and also the methods of making experiments of this kind, the Committee will state that it is desirable to know :

1. The kind of locomotive employed in the experiment, its total weight, the distribution thereof on the wheels, and the

principal dimensions of the boiler and engines, their condition, and the length of time it has been in service.

2. The weight of the train, the distance run, the running time, the grades and curves of the road.

3. The kind of fuel used, and the weight consumed in hauling the train.

4. The quantity of water evaporated in doing the work.

5. The steam pressure employed.

6. The temperature of the gases in the smoke-box.

7. The temperature of the fire in the fire-box.

8. The action of the steam in the cylinders, as shown by indicator diagrams, taken at different speeds and points of cut-off.

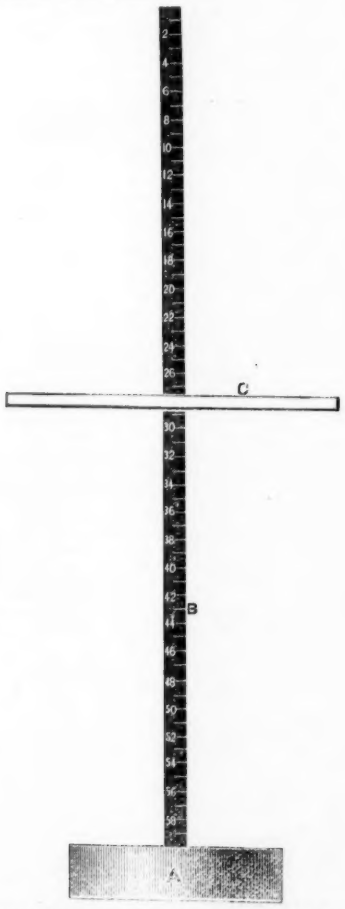
9. The date of the experiment, and the temperature of the air, as indicated by an ordinary thermometer.

The kind of engine employed can be shown best by a skeleton drawing, which will represent the principal parts only, with dimensions marked on it; but a photograph of the engine is better than nothing. The engine should be weighed in exactly the condition it is in when working, and with two men on it, but uncoupled from the tender. It is important, however, to know that the scales used weigh correctly, which it is hardly necessary to say, ordinary track scales often do not. It is also desirable to know the quantity of water which the boiler carries. To determine this, first weigh the engine with the water at the height at which it is ordinarily carried on the road. Then blow all the water out of the boiler and weigh the engine again. A suitable blank form is appended hereto, in which the weight and dimensions of the engine can be conveniently entered.

The weight of the train would of course be most accurately obtained by weighing each car. When this is not practicable, state the number of cars, the number of wheels under each car, and whether they were loaded or empty. The distance run is of course easily obtained. The running time should be recorded either with a speed indicator, or by some one noting the time of passing each mile post, and of arriving and leaving stations. The grades should be shown by a profile of the road on which the radius and length of each curve should be marked.

It is best, if bituminous coal is used in experiments in which accuracy is aimed at, to pick the fuel, and use lumps of coal only, because otherwise it is impossible to tell what proportion of that used is fine coal or dirt. Before making the experiment, the tender should be carefully swept out, and all the fuel, including that used for kindling, should be *weighed* on scales which are *known* to be accurate. The remaining coal, when the run is completed, should again be weighed, and, of course, be deducted from that first taken. The kind of coal used should also be noted.

The quantity of water evaporated should be determined by a gauge consisting of a wooden float, similar to that represented in the engraving below.



It consists of a wooden float, *A*, which is placed on the surface of the water, through the man-hole of the tender. A wooden stem or rod, *B*, which is graduated in inches, is attached to the float. This rod moves easily through a hole in a board, *C*, which is placed in the coping of the man-hole. By observing the height at which this gauge stands after and before the tender is filled, the difference will of course indicate the number of inches of water used. Before making the experiment, the quantity of water contained in each inch should be ascertained by placing the tender on the scales, and then measuring the height of the water, and weighing the tender. The water may then be allowed to run out until the gauge indicates 12, or any other number of inches less than at first. If the tender is then weighed again, the difference between the first and the last weight will give the weight of the number of inches of water indicated by the gauge, from which the weight of an inch in height of water in the tender can easily be obtained. If the quantity of water in the boiler before and after the experiment is the same, that which is drawn from the tender will of course represent that which has evaporated, provided none has been wasted by leakage, priming, or by the injector, or for wetting coal, or other purposes. Care should therefore be exercised that there is no waste of water for these or other causes.

The pressure of steam should be recorded, either by a recording gauge, or by placing an intelligent boy on the engine and having him note the pressure once every minute while the engine is running.

The temperature of the gases in the smoke-box may be obtained by using pyrometers. Two should be used, so that the one may be a check on the other. A record of these should be taken once every minute while running a distance of 10 or 12 miles on a level piece of track, and again while going up the steepest grade, on the part of the road on which the experiments are made.

The temperature in the fire-box can be obtained if a piece of wrought iron of known weight, say 60 lbs., is placed in the fire until it is heated up to the temperature of the fire, and then removing it quickly, and placing it in a vessel (of wood preferably) containing a known weight of water, say from 60 to 100 lbs., and observing the temperature of the water before the iron is put in and after, say in ten or twenty minutes, when it has communicated all its heat to the water. These phenomena must, however, be observed and recorded with great care and accuracy, as a trifling error will lead to very erroneous results.

The indicator diagrams should be taken in the ordinary way, with the throttle wide open, and the speed at which they are taken noted. The speed can be known if an attendant will count the revolutions of the driving wheels for any given time when the diagram is taken. At ordinary speeds this is possible, but when running fast, a revolution counter or speed indicator will be necessary to be sure of a correct count.

The Committee, of course, do not expect to procure all the data enumerated above from any ordinary experiments, and, therefore, they request members of the Association to send records of any experiments which they may have made recently, even though the data recorded may be of only one or more of the phenomena described above. Carefully made experiments, with an accurate record of all the facts referred to in this circular, would, however, have exceptional value at the present time. If experiments are made with engines of peculiar construction, or under unusual circumstances, members are requested to furnish drawings of the peculiarities, and describe the circumstances attending the experiment.

M. N. FORNEY,
R. H. THURSTON,
W. WOODCOCK,
Committee.

Replies should be addressed to M. N. FORNEY,
No. 73 Broadway, New York.

DIMENSIONS AND WEIGHT OF LOCOMOTIVES EXPERIMENTED WITH.

On the.....Railroad,
By.....Master Mechanic, date.....187..

Description of locomotive.....
Number of driving wheels.....Truck wheels.....
Length of driving wheel base.....
Total " " .....
Total weight of engine in working order.....lbs.
" " on driving wheels " .....lbs.
" " truck " " .....lbs.
" " of water in boiler .....lbs.
Diameter of driving wheels.....
" " cylinders.....Stroke.....
Size of steam ports .....Exhaust ports.....
Greatest travel of valve.....Lead in full gear.....
Outside lap of valve.....Inside lap.....
Length of grate .....Width.....
Height of fire-box.....
Tubes, number.....Diameter.....Length.....Material.....
Heating surface in fire-box.....in tubes.....Total.....
Exhaust nozzles, (single or double).....Diameter.....
Diameter of inside pipe in smoke-stack.....

REMARKS.

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MACHINERY FOR SUPPLYING WATER TANKS.

DEAR SIR: The undersigned, a Committee re-appointed at the last annual convention of the American Railway Master Mechanics' Association to report upon the subject of "Machinery for Supplying Water to Tanks, Giving Description of Engine, Windmill or Device, with Cost of Working the Same," beg leave to call your attention to the following questions, and solicit an early reply to the same:

1. What arrangements have you for supplying water to tanks at water stations on the line of your road?

2. Please give description of engine, steam pump, windmill, horse power or other device, employed for the purpose, the number of gallons raised per day, or for each twenty-four hours, and the cost of working the same; or, if the tanks are supplied by a natural fall, describe the kind of pipes used to convey the water, and the best method of putting them down; the kind of bulkhead or dam at the fountain, and best method of keeping the strainer from being choked up or damaged from driftwood, etc.; also describe the means of protection you have found most effectual in frosty weather for pipes under ground or otherwise situated, and for tanks in open air and machinery in buildings.

3. Describe what arrangements you have for delivering water from tanks to the tenders, and state whether it can be practicably kept free from leakage and safe during frosty weather.

4. Describe the best method you are familiar with for supplying water to tanks.

5. In your description, give, as far as convenient, drawings or sketches of the parts you describe; and, where practicable, statements of the cost of the work.

6. The Committee are desirous that the importance of giving the *cost* of raising the water, and the number of feet raised, may not be overlooked, as a satisactory report cannot be made without it. Respectfully yours,

J. L. WHITE, Evansville & Crawfordsville Railroad,
J. H. FLYNN, Western & Atlantic Railroad,
HOWARD FRY, Erie Railway,
Committee.

Please address your reply to J. L. WHITE, Master Mechanic, Evansville & Crawfordsville Railroad, Evansville, Ind.

MECHANICAL LABORATORY.

DEAR SIR: The Committee ordered to be continued at the last meeting of the American Railway Master Mechanics' Association for further inquiry into the subject of the establishment of a Mechanical Laboratory, again respectfully request such a full consideration of this subject on the part of each member of the Association, that no difficulty may be experienced in arriving at a definite and satisfactory decision during the next convention. In order, therefore, to gather in a concise form the general or prevailing opinion of the members, the Committee invite your especial attention to the chief points of the subject, as contained in the following questions, to which they solicit your answers, together with any useful remarks or information you may be able to give.

1st. Do you consider the establishment of a Mechanical Laboratory in any form whatever as a necessary adjunct to our Association?

[Notwithstanding the character of your answer to the above question, your replies to the following questions will be valuable in case the establishment of such a Laboratory be ultimately determined on.]

2d. Should such a Laboratory be established as an independent institution, owned and controlled entirely by this Association, or would the object in view be better served or accomplished by the Laboratory forming a part of some other outside institution?

3d. If the majority of the members should prefer that the Laboratory be established as an independent institution, in what city do you consider its location would render the greatest benefit to members of the Association generally.

4th. Do you think the railroad company in whose service you are engaged would be willing to subscribe its share (a very small amount if divided over all roads) toward the establishment and maintenance of such a Laboratory, providing that its regulation and management were placed under the control of the presidents of the leading railroads, as was fully explained in report of this committee to the last convention?

5th. Do you know any fairer or more equitable plan for providing for the first expense of establishment and maintenance of such a Laboratory than the one suggested in this committee's last report of pro-rating such expenditure between all the railroads willing to subscribe, in accordance with the number of locomotives each road possessed during each year?

6th. Should the majority of the members intimate a preference for the Laboratory to be established in connection with some other outside institution, would you be favorable to our forming a connection with the Stevens' Institute of Technology, of Hoboken, N. J., taking advantage of the arrangements suggested by Prof. Thurston, or do you know of any other institute offering facilities which you think preferable to those of the Stevens' Institute?

7th. In the event of the majority deciding to take advantage of the privileges offered by the Stevens' Institute (and it being understood that the Association in such case would have no special control over any contributions it may make to the Laboratory of that Institute, beyond facilities under certain regulations to conduct experiments), would you vote for appropriating, at next convention, any portion of the balance of the funds of the Association, as a special contribution to the Laboratory of the Stevens' Institute of Technology? If so, what amount would you suggest?

Yours, faithfully,
W. A. ROBINSON, Great Western Railway of Canada.
R. WELLS, Jeffersonville, Madison & Indianapolis.
J. M. BOONE, Pittsburgh, Ft. Wayne & Chicago.
N. E. CHAPMAN, Cleveland & Pittsburgh.
H. M. BRITTON, Whitewater Valley.
} Committee.

Please address replies not later than 1st March to W. A. ROBINSON, Mechanical Superintendent, G. W. R., Hamilton, Ontario, Canada.

Locomotive Runners, Their Condition and Their Pay.

A correspondent of the Quincy *Whig*, signing himself "E. C. Centric," writes in that paper concerning some comments on locomotive runners contained in a late number of the *Official Guide*, which he calls very unfair and one-sided. He says:

Now, I am not, never have been, nor never expect to be, a locomotive engineer, and as I have been for years employed in active railroad service where I was in daily contact with engineers, I believe I can give evidence. For the benefit of those who are not informed, I will mention that with few exceptions locomotive engineers are paid by the mile, not by the month, consequently when business is dull these men suffer more in proportion than their employers, the railroad companies. This important fact is very carefully concealed by these persons who take such delight in traducing the engineers. These writers not only take great care to parade the statement that the roads are doing a poor business—not able to pay interest—are generally in a poverty-stricken condition, etc., etc., but take still more pains to conceal the fact that, such being the case as regards the roads, the engineers are in a suffering condition, or at best, are barely able to make both ends meet.

Managers can have meetings, lay plans, and proceed to enforce starvation wages upon their employes, or raise freight and passenger rates 25 per cent., and not a word be said against any or all of their arrangements; but let the engineers "protest most earnestly against any reduction," and it is proclaimed from Maine to Mexico by these toadies of the press, calling it "an effort at tyranny," "an outrage upon justice," and speak of the "language of dictation" as if an American freeman had not the right to protest against that which he knew would bring want and suffering to his wife and children.

Speaking of the "protest" the writer in the *Guide* says: "If these words mean anything, they mean the locomotive engineers know better than all other persons the financial condition of all railroad companies—that they know better than the managers and accounting officers what their receipts and expenditures are, and therefore they are the best authority as to what wages the various companies can and ought to pay."

Now, this is all bosh, (and the writer knows it) written to please certain stockholders and officials, and to delude the public. The locomotive engineers do know what their own receipts and expenditures are, and therefore they are the best authority as to what are the lowest wages they can support themselves and families on. Quoting again, the writer says: "The man who drives an engine has no more right to demand from a railroad company a certain *fixed* (italics are ours) sum of money for his services than the widow and orphan have to demand the dividends upon their stock." &c., &c.

It is plain if the writer knew anything at all about what he was writing, he knew that the locomotive engineers, as a rule, do not get, and do not ask for a "certain fixed sum of money for their services," nor do they ask for an advance in their wages; they expect when business is dull to suffer the consequences, still they do not want their wages cut down to such a low figure during the busy season that when the slack season is at hand they will not have the means of support. Another favorite plan of the these writers is to hunt up some engineer who, by force of circumstance, has been running night and day for the greater part of a month, probably not having taken off his clothes half a dozen times, who had to sleep on his engine and get along with one or two meals per day during most of that time. They find that by this extraordinary endurance on his part he has earned possibly $140. Without counting out any for doctor's bills they multiply this sum by twelve and declare that all engineers get princely salaries, ranging from $1,600 to $2,000 per annum. Why is it not as well to state that during the slack season they do not average $60 per month? or why do not they have at least honor enough to mention that engines frequently need repairs, and when his engine is laid up the engineer must take his chances to make even his board during the month or six weeks that his engine is idle? If locomotive engineers are the villainous set that these traducers would have the public believe, the truth will be bad enough, and by sticking to it these writers may stand a better chance of avoiding the fate mentioned in the 21st chapter of Revelations, latter half of 8th verse.

British Board of Trade Rules for Working Single-Track Railroads.

The Railway Department of the British Board of Trade, in transmitting copies of Captain Tyler's report on the Thorpe collision, has sent the following circular recommending the following regulations on single-track lines:

Modes of Working Single Lines.—In the case of a line being single, a certificate, under the seal, and signed by the Chairman and Secretary of the company, should be sent to the Board of Trade, through the inspecting officer, to the effect

that one of the two following modes of working single lines will be adopted, namely:

I. That only one engine in steam, or two or more engines coupled together, shall be allowed to be upon the single line at one and the same time.

II. That the line shall be worked by train staff, in the mode described in the following amended regulations, combined with the absolute block telegraph system:

Rules for Working the Single Line between A B C, &c.

Either a train staff or a train ticket is to be carried with each engine or train to and fro, and for this purpose

	Color of Staff and Ticket.	Form of Staff and Ticket.
(One, two, or more) train staffs and sets of train tickets will be employed, viz.:		
One between A and B	Red.	Square.
One between B and C	Blue.	Round.
&c. &c.	&c.	&c.

No engine or train is to be permitted to leave or pass either of the staff stations A, B, or C, etc., unless the staff for the portion of line over which it is to travel is then at the station; and no engineman is on any account to leave or pass a staff station without seeing such train staff. If no second engine or train is intended to follow, the staff is to be given to the engineman or guard. If other engines or trains are intended to follow before the staff can be returned, a train ticket, stating "staff following," is to be given to the engineman of the leading engine or the engineman or guard of the leading train, and so on with any other except the last, the staff itself being sent with the last. After the staff has been sent away, no other engine or train is to leave the staff station under any circumstances whatever until its return. The train tickets are to be kept in a box fastened by an inside spring, and the key to open the box is the train staff, so that a ticket cannot be obtained without the train staff. The train staff is to lock the box in being taken out of it. The train staffs, the train tickets, and the ticket boxes, are to be painted or printed in different colors, red for the line between A. and B.; blue for that between B. and C., etc.; the inside springs and the keys on the staffs being so arranged that the red staff cannot open the blue box, nor the blue staff the red box, and so forth. This is to prevent mistakes. The ticket boxes are to be fixed by brackets in the booking offices at the staff stations, the brackets being turned up at the ends to receive the train staffs when they are at the stations. The clerk in charge, the inspector, or the person in charge for the time at a staff station, is the sole person authorized to receive, exhibit or deliver the staff or ticket. The usual special train tail signal, "engine following," is to be used when a ticket is given, for the guidance of the platelayers and gatekeepers on the line. When a ballast train has to work on the line the staff is to be given to the engineman or guard in charge of it. This will close the line while the ballast train is at work. The ballast train must proceed afterwards to one of the staff stations to open the line, before the ordinary traffic can be resumed. In the event of an engine or train breaking down between two staff stations, the fireman is to take the train staff to the staff station in the direction whence assistance may be expected, that the staff may be at that station on the arrival of an engine. Should the engine or train that fails to be in possession of a train ticket instead of the staff, assistance can only come from the station at which the train staff has been left. The fireman will accompany any assisting engine to the place where he left his own engine. N. B.—The train staff may either be fixed in a socket on the engine or tender, or carried over the shoulder by means of a cross belt.

Precautions Recommended in the Working of Railways.—There should be a brake vehicle with a guard in it at the tail of every train. This vehicle should be provided with a raised roof and extended sides, glazed to the front and back; and it should be the duty of the guard to keep a constant look out from it along his train. There should be means of intercommunication between a guard at the tail of every passenger train and the engine driver, and between the passengers and the servants of the company. There should be at least one brake vehicle to every three or four carriages in a passenger train, a proportion which may be economically provided by the use of continuous brakes. On steep inclines, and with trains which travel at high speed, a larger proportion of brake power is required. The tires of all wheels should be so secured to the rims of the wheels as to prevent them from flying open when they are fractured. The engines employed with passenger trains should be of a steady description, with not less than six wheels, with a long wheel base, with the centre of gravity in front of the driving wheels, and with the motions balanced. They should not be run tender first. Records should be carefully kept of the work performed by the wearing parts of the rolling stock, to afford practical information in regard to them, and to prevent them from being retained in use longer than is desirable. When a line is worked by telegraph, the telegraph huts should be commodious, and should be supplied with clocks, with record books, with a separate needle for signalling the trains on each line of rails, and with an extra needle for other necessary communications between the signalmen. The telegraph instruments and signal handles should face the directions in which they work. When drovers or other persons are permitted to travel with goods or cattle trains, suitable vehicles should be provided for their accommodation near the front of such trains. Luggage should not be carried on the roofs of railway carriages. The names of the stations should be marked on the lamp, besides being shown on other conspicuous places.

Proposed Railroad Postal Service Law in Germany.

The following account of the proposed law for regulating the relations of the railroads with the Post-Office Department of Germany, which seems thoroughly tyrannical, is given by a correspondent of the London *Railway News*:

A great sensation has been created in railway circles in Germany, and still more among shareholders in those companies, the value of whose shares have in consequence experienced a fall to some extent, by its having transpired that the Chancellor of the Empire has sent down to the Federal Council the draft of a bill repealing the Act of October 28, 1871, regulating the relations between the post office and the railways, and imposing some fresh and very onerous conditions. When it shall have passed the Bundesrath it will be introduced into Parliament with the intention of passing it in the course of the present session; but as the railway interest is very numerously and strongly represented in that Assembly—most of the members holding shares in the local railways in the electorial district by which they were returned—it seems very questionable whether the Government will be able to pass the bill at all, but certainly not without many alterations and amendments. All the advantages are on the side of the post office, and all the onerous conditions have to be borne by the shareholders.

As I have been able to obtain a copy of the draft of the bill it will no doubt interest many of your readers to learn how they manage these things in Germany, and I therefore subjoin a translation of the principal and most onerous clauses, which are as follows: "All railway undertakings are bound to perform the following services for the post office: 1. The working of railways, as far as the nature of the case admits it, must be brought into full accordance with the requirements of the post office functionaries. 2. The railway companies are bound to forward with every regular passenger train if required, and without any compensation or charge, a mail carriage, furnished at the expense of the post department, and containing mail matter, with the officials accompanying and in charge of the same, or sent on special post-office service, and returning after the performance of their duty. 3. On lines where the traffic is not so extensive as to require a separate and entire carriage for the conveyance of the mails, the service may be carried on in one of the compartments of a passenger carriage, the arrangement and fitting up of which will be done at the expense of the post office. 4. In trains not used for the regular postal service the railways are bound to forward special mail matter, if so required, by the railway official in charge of the train, and make room for it in one of the carriages free of expense. 5. Should the one mail carriage or the compartment fitted up for the purpose not suffice for the wants of the Post office, the railways are bound to give notice that additional room is required and to forward such extra carriages, or, in case of need, place at their disposal a suitable covered goods wagon, at the option of the postmaster, in all cases free of charge. 6. The requisite railway mail carriages will be provided by the post office, but the railways are bound to have them cleaned, kept in order, and placed in and taken off the train by their own servants, for which they may charge the expenses actually incurred. Where the railway mail coaches have to remain for a time at the terminal stations unused, no charge can be made if allowed to stand in the open air. The railways are bound to assign a place at the stations for loading and unloading the mail matter. Empty post-office carriages must be conveyed free of expense over the line on which they are about to be placed for regular duty, and on others at the usual charge for covered goods vans. In the case of post-office carriages being disabled and not in a condition to run, the station-master is bound to provide a goods van as a substitute, for which service the usual tariff charge will be allowed. 7. In the arrangement of new stations and alteration of old ones special apartments for the postal service and dwellings for the officials must be set apart and fitted up, for which a moderate rent may be charged. Disputes between the railways and the post office are to be settled by the Imperial Railway Central Department after hearing both sides of the question. Remunerations to Governments for special post-office service on state railways, founded on State treaties, will be continued to be paid for a period of eight years after the present law shall have come into operation, unless in the meantime some other arrangement be made with such Governments. 8. This law shall come in operation on January 1, 1876, on all State and private companies' railways in Germany, with the exception of the kingdoms of Bavaria and Wurtemburg, which have their own separate railway regulations and autonomy.

Massachusetts Railroads.

The Boston *Advertiser* gives the following review of the business of the Massachusetts roads for the fiscal year lately ended:

The railroad year in Massachusetts has not been so satisfactory as preceding years. The roads have been forced to increase their capital stock and their debt; they have earned less in gross, and their operating expenses have not diminished. The 18 roads reported in our annual tables both last year and this have increased their capital stock by $753,000. The largest increase was that of the Lowell road, $207,000. Seventeen roads have increased their gross debt from $38,168,169 to $46,892,275, being an increase of more than 22 per cent., and the total debt of the 21 roads reported this year amounts to $48,851,207. As might have been expected from the condition of business throughout the country, the chief loss in receipts has been from freight. This appears most plainly in the statistics of the Boston & Albany road, which carried less freight and for a smaller average return than last year. On the other hand, the passenger mileage increased while the rate decreased, leaving a fractional gain in this item of receipts. Other roads show a similar state of affairs, but the aggregate loss is diminished by a very considerable increase in both freight and passengers on the Eastern road, in consequence of its new connections. It may be that a part of this exceptional gain is due to the greater number of miles reported, but it appears to be an actual increase. The net income of the Boston roads has declined from $5,438,731 to $4,827,248. Their expenses increased from $16,818,991 to $16,872,730; and their gross receipts fell from $22,257,732 to $21,699,978. It will be seen that on the whole, and remembering how greatly business has been depressed, the roads have done very well, having nearly held their own, and they may fairly expect a considerable gain next year.

The most interesting part of the table to the general public will, we think, be found in those parts of the report which relate to the average rates charged by the several roads for their services. In this matter we have the means for making exact comparisons, and the general result will be found to be a reduction of rates. We select for comparison the same roads which we chose last year, and give the figures for three years. It will be understood that the amounts are in cents and the rate per mile is given:

	Passengers. Transient. 1872.	1873.	1874.	Season. 1872.	1873.	1874.
Boston & Albany	2.69	2.68	2.61	1.05	1.30	1.02
B., C. & Fitchburg	3.76	2.82	2.80	0.55	0.98	0.94
Boston, Hartford & Erie	2.58	2.69	2.47	0.86	1.50	1.00
Boston & Lowell	2.74	2.75	2.67	0.99	1.60	0.96
Boston & Maine	2.59	2.65	2.27	1.47	0.85	0.81
Boston & Providence	2.93	2.72	2.80	1.16	1.13	1.01
Connecticut River	3.20	3.00	3.00	0.82	0.82	0.88
Eastern	2.47	2.21	2.35	0.88	0.84	0.87
Old Colony	2.60	2.70	2.51	1.00	0.90	1.00

	Passengers. General Average. 1873.	1874.	Freight. 1872.	1873.	1874.
Boston & Albany	2.49	2.47	2.87	2.86	2.62
Boston, Clinton & Fitchburg	2.48	2.10	3.20	2.93	2.86
Boston, Hartford & Erie	2.24	2.08	3.00	4.40	4.40
Boston & Lowell	2.30	2.30	3.90	3.80	3.50
Boston & Maine	2.12	1.83	2.85	2.85	2.85
Boston & Providence	2.30	2.30	4.19	4.74	4.90
Connecticut River	2.80	2.85	7.30	3.70	4.00
Eastern	1.83	2.00	4.20	3.17	3.65
Old Colony	2.30	2.19	5.49	4.88	2.86

The reduction has not been uniform. In a few cases the average rates have increased. But in general the exhibit is one of decreasing charges. Thus there is not one of the nine roads named which has not lowered its average fares for transient passengers during the last two years, and all but three show a reduction within the last year. Five of the nine show a reduction in season tickets in two years, one charges the same as in 1872, and three have increased slightly. On the whole passenger business, five show a reduction in one year, two have not changed, and two have increased slightly. The freight tariffs of four roads have been reduced steadily, one has maintained its charges without change, and on the other four there have been fluctuations; but on six of the nine roads the charges are now lower than two years ago.

The rolling stock naturally shows but a small increase, but there has been improvement in the old. Last year's returns showed that but 11 of the 21 roads we report this year had any locomotives equipped with train brakes, and there were but 190 locomotives so equipped in all. This year 14 roads have adopted the system, and they have 307 engines so equipped. There are now 1,111 cars with train brakes, against 684 a year ago. The safety platforms have not been so generally adopted, but the use of them has largely increased nevertheless.

LOCOMOTIVE RETURNS, AUGUST, 1874.

Master Mechanics of all American railroads are invited to send us their monthly reports for this table.

Name of Road.	Number of mls. operated	Number of Locomotives in service	Mileage	No. Miles run to Ton of Coal	Cord of Wood	Pint of Oil	Av'rage No. of Freight Cars Hauled	Cost per Mile in Cents for Repairs	Fuel	Stores	Miscellaneous	Engine'rs, firemen and wipers	Total	Av'ge cost of Coal, per ton	Wood, per cord
Allegheny Valley (July)		64	153,724	36.60		19.60		4.96	4.89	0.89		7.82	18.56	$1.60	$2.70
Atlantic & Great Western (First & Second Div.)	228	80	208,027	54.93		16.53		6.19	4.74	0.58	0.82	6.41	18.74	2.47	3.25
" " " (Third & Fourth Div.)	203	50	105,154	54.93		17.60		5.68	4.74	0.46	0.98	6.2-	18.06	2.47	3.25
" " " (Mahoning Division)	113	59	145,071	54.93		19.03		2.96	4.74	0.40	0.58	5.91	14.59	2.47	3.25
" " " (Shenango & Allegheny)	33	9	18,663	69.63		27.89		0.82	3.13	0.28	0.76	5.91	10.90	2.00	2.25
California Pacific															
Central Pacific (Western Division)	173.4	41	108,767	41.26		17.91		9.08	19.70	0.77	0.34	8.37	38.26	7.91	4.70
" " (Sacramento Division)	119.5	40	95,092		28.32	16.41		10.75	16.60	0.85	1.06	8.34	37.60		4.70
" " (Truckee Division)	204.5	25	62,035	39.50	50.00	17.42		9.79	18.68	0.68	0.76	8.40	38.31	7.91	4.70
" " (Humboldt Division)	236.6	21	59,565	47.54		18.68		6.73	16.47	0.74	0 33	7.76	32.03	7.91	4.70
" " (Salt Lake Division)	182.8	22	60,674	45.21		15.90		6.28	16.99	0.77	0.73	7.67	32.44	7.91	4.70
" " (Oregon Division)	151.48	7	19,742		39.96	23.17		3.51	11.76	0 63	0.69	7.54	24.13		4.70
" " (Visalia Division)	188.3	10	25,345	45.07	50.00	15.97		3.56	17.33	0.84	1.44	7.39	30.56	7.91	4.70
Chicago, Burlington & Quincy		290	761,125	39.17		14.92	20.02	4.43	7.09	0.59		7.73	19.84	2.70	4.25
Chicago, Rock Island & Pacific (Illinois Div.)		91	202,022	42.07		17.13		3.46	6.00	0.60		6.99	17.05	2.40	3.80
" " (Iowa Division)		72	183,132	38.97		16.96		4.38	6.45	0.62		7.10	18.55	2.40	3.80
" " (Southwestern Div.)		45	122,026	44.05		12.89		4.83	5.68	0.79		6.39	17.69	2.40	3.80
Cleve., Col., Cin. & Ind. (Columbus Div.)	138	54	147,173	48.08	58 51	34.89		1.98	6.06	0.56		7.02	15.62	2.68	3.50
" " " (Indianapolis Div.)	207	66	2,6,009	41.64	57.00	27.13		5.07	6.92	0.56		6.92	19.47	2.72	3.50
" " " (Cincinnati Div.)	130	29	73,125	38.68		20.80		4.43	6.04	0.56		7.56	18.59	2.13	3.50
Cleveland & Pittsburgh		87	166,316	59.27		17.84		4.58	4.09	0.70		7.07	16.44	2.10	1.95
Del., Lacka. & West. (Bloomsburg Div.)	80	23	56,760	50.67		20.63		5.34	4.38	0.71		6.34	16.77		
" " (Morris & Essex Div.)		97	213,920			24.75		6.55		0.52		7.69	14.76		
Denver Pacific			14,502	55.02		12.03		6.28	6.34	0.54		5.73	19.89	3.50	6.74
Flint & Pere Marquette			78,901		61.77	24.47		3.53	7.28	0.60		6.34	17.75		4.50
Illinois Central (Chicago Division)	262.5	62	174,767	42.31		15.67	18.49	3.99	4.81	0.38		6.71	15.86	1.90	4.35
" " (South Division)	230.75	33	71,205	34.17		13.75	18.20	6.96	5 39	0.43		6.70	19.98	1.90	4.35
" " (North Division)	225	48	98,962	33.93		14.78	19.24	10.28	5.92	0.39		6.73	23.32	1.90	4.35
" " (Iowa Division)	401	42	92,666	37.42		18.17	12.74	4.47	6.48	0.32		6.58	17.85	2.30	5.95
Indianapolis, Bloomington & Western		67	164,360			10.75		3.90	6.55	0.88		8.36	19.69	2.05	3.40
Kansas Pacific		88	163,941	42.40		12.69		4.94	8.47	0.53		6.74	20.68	3.50	4.20
Kansas City, St. Joseph & Council Bluffs*		23	61,752	50.70		21.70	21.80	6.70	6.60	0.60		7.60	21.50	3.00	4.00
Lake Shore & Michigan South. (Buffalo Div.)†		92	179,894	51.63	49 07	15.65		5.53	6.78			6.53	18.84	3.50	3.50
" " (Erie Div. †)		114	233,355	46.51	64.05	21.64		5.43	7.58			6.16	19.07	3.50	4.00
" " (Toledo Div.)†		79	149,323	39.21	51.89	13.47		5.67	9.58			7.34	22.59	4.00	4.00
" " (Mich. South. Div.)†		211	412,067	51.76	62.87	19.42		6.53	7.49			7.36	21.38	4.50	3.50
Louisville, Cincinnati & Lexington			87,245	50.00		13.00		5.20	9.94	0.88		8.22	24.24	4.23	4.15
Leavenworth, Lawrence & Galveston	182.7	17	25,232	60.36		22.33		4.81	6.49	0.48		6.80	18.59	3.62½ per bu.	5.00
Pennsylvania (New York Division)	119.9	111	251,902	38.04		11.09		7.36	17.30	1.10			25.70	0.23	7.08
" (Amboy Division)	154.2	59	101,261	56.82		16.03		4.40	11.70	0.80			16,90	0.23	7.05
" (Belvidere Division)	102.5	34	63,682	46.66		12.82		2.70	13.90	1.30			17.90	0.23	7.09
" (Philadelphia Division)	204.3	163	402,535	35.15		14.34		2.80	5.90	0.80			9.50	0.07	3.36
" (Middle Division)	131.6	136	306,112	42.25		22.52		5.10	4.90	0 60			10.70	0.07	3.36
" (Pittsburgh Division, East End)		70	138,826	25.82		14.01		7.90	7.90	0.80			16.60	0.07	3.36
" (Pittsburgh Division, West End)		101	245,555	35.65		15.58		5.50	5.70	0 70			11.90	0.07	3.36
" (Tyrone Division)	100.3	23	43,199	27.11		29.76		3.20	7.60	0.60			1 .40	0.07	3.36
" (West Pennsylvania Division)	103.6	27	53,500	41.91		37.59		4.20	5.00	0.40			9.60	0.07	3.36
" (Lewistown Division)	62.5	7	15,860	58.00		24.15		2.90	3.60	0.50			7.00	0.07	3.39
" (Bedford Division)	56.5	5	9,269	59.94		29.94		1.10	3.60	0.50			5.20	0.07 per ton.	3.41
Pitts., Fort Wayne & Chicago (Eastern Div.)	468.9	178	403,570	39.76		15.77		4.29	5.76	0.85	0.91	6.69	18.50	2.28	2.28
" " " (Western Div.)	280	109	260.322	52.00	45.00	16.95	29.90	3.60	5.60	0.60		6.50	16.3	2.85	3.25
Pitts., Cin. & St. Louis (Little Miami Div.)		41	104,315	40.90		11.85		3.80	6.50	0.80	3.10	7.40	21.60	2.25	3.46
South Carolina															
Stockton & Copperopolis	49	3	3,890	94.79	41.94	11.72		0.43	12.36	1.37	2.19	11.33	27.68	12 25	5.00
Toledo, Peoria & Warsaw	250	45	80.026	37.10		21.90		6.20	5.60	0.40		6.90	19.10	1.90	3.50

* Three empty cars rated as two loaded ones.

† Switching engines allowed six miles per hour.

RAILROAD GAZETTE

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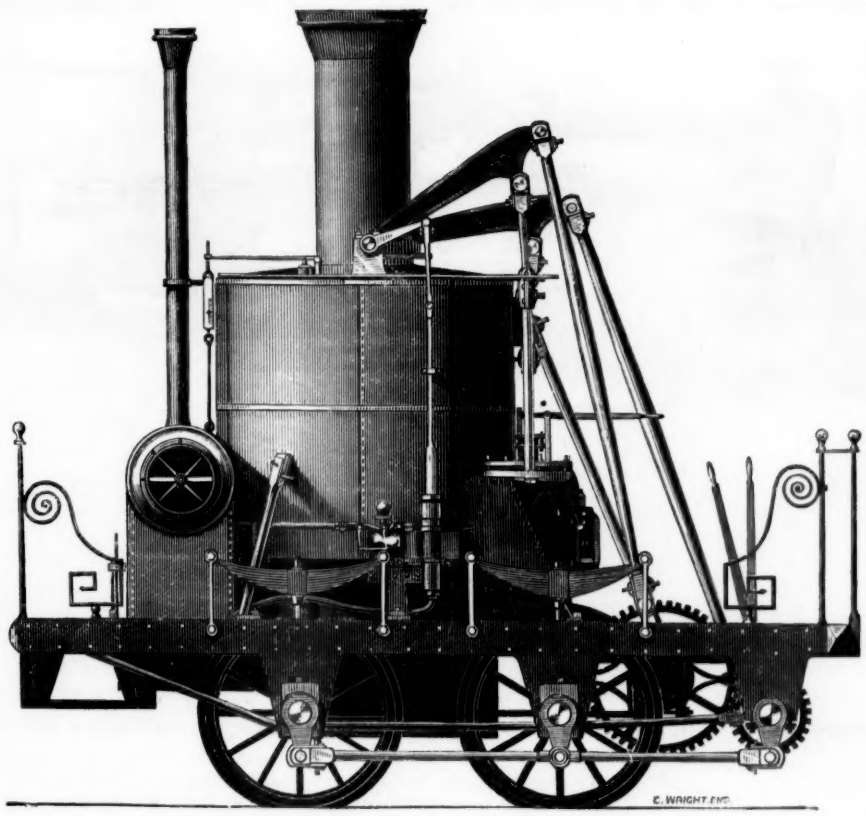
ANNOUNCEMENT FOR 1875.

THE RAILROAD GAZETTE has now been published weekly in its present form since April, 1870. During that time it has been the constant aim of its publishers to furnish its readers with the latest and most reliable information concerning the railroad system in this country, and for doing this it has facilities which very few individuals can command. The collecting of such information is the business of its editors, and in the prosecution of this business for several years they have naturally acquired considerable skill. They know where to look for information; they keep track of the new ways of doing work or transacting business, of the new structures, materials, machines, etc., designed to improve the construction and working of railroads. Moreover, during the five years since the paper was started, it has gained the confidence, esteem, and goodwill of a very large share of the ablest railroad men of the country—those whose experience and judgment are worth most—and these are continually aiding the paper, not only by communications published in it, but by hints and suggestions to the editors, and by information given in conversations, etc., and by documents printed or otherwise, relating especially to the affairs of some one company, but having on some points a general interest.

It is believed that almost any railroad man will find it an advantage to him to take and read this paper, that it will help him to do his work better, and do something towards preparing him to take a higher position, or to be more useful in the particular grade of service to which he may belong, aside from the satisfaction to be gained by keeping informed of the events in the railroad world, and the progress of all departments of railroad business. No man is fitted for any important position on a railroad who does not have some pretty accurate general idea of nearly all departments of railroad business outside of his own peculiar field. THE RAILROAD GAZETTE gives facilities for getting this information which can hardly be found elsewhere. At the present time, when in many of the States there is a disposition to deny to railroad proprietors a reasonable income on their investments, a railroad man of almost any grade may do a real service to his company, and to the community, too, if he has some knowledge of the principles which govern the cost of transportation and, also, those (not always the same) which properly determine the fixing of rates. THE RAILROAD GAZETTE has given great attention to these matters, which do not naturally come under the attention of most railroad men. The railroad companies, as they grow older and more stable, are finding that their prosperity, and often their very existence, depend upon their adopting the most economical methods of working in all departments; and they are finding, too, that it is indispensable to such economy to have intelligent and well-informed officers and men. Everyone who has been familiar with railroad business since the war must have been struck with the great increase in the salaries paid to railroad officers of distinguished ability: it is found that it pays to have brains on a railroad, and it is evident that it will become harder and harder in future for a man to rise in the service of a railroad company unless he is thoroughly well informed concerning his business. This is true in all departments; in the locomotive and car departments, in the shops, and on the road, among track-men and station-men, and engineers; in the running of trains, among train-men, train-dispatchers, train-masters, division-superintendents, etc.; at the general offices and in the staff, among general managers, superintendents, freight and ticket agents, accountants, purchasing and supply agents, etc. We have very few books on railroad business in our language, and THE RAILROAD GAZETTE is the only periodical intended to supply the needs of the practical railroad men engaged in working a railroad, or in constructing it or equipment or materials for it.



THE BALTIMORE & OHIO "GRASSHOPPER" LOCOMOTIVE,

As Manufactured 40 years ago by Gillingham & Winans, B. & O. R. R. Company's Mt. Clare Depot, Baltimore, Md.

"The characteristics of this engine are: 1. The use of anthracite coal as fuel. 2. The vertical tubular boiler. 3. The use of adhesion of all four wheels. The boiler is competent to supply steam to work up to the adhesion of all the wheels at the rate of ten miles an hour, or to produce a continuous horizontal pull of 2,322 lbs., equal to drawing 211 tons on a level road at the rate of ten miles an hour, as determined from actual experiment. See 9th Annual Report of B. & O. R. R. Co., p. 79. This engine has drawn, exclusive of its own weight, 17¼ tons up an ascent of 200 feet per mile for 2,150 feet at the uniform rate of 6 miles per hour. See Report of Committee of City Council of Baltimore, March 24, 1836. The weight of this engine varies from 7 to 8½ tons."

Its contents may be classified under three heads: 1, Railroad news; 2, Contributions, Notes and Discussions from railroad men, engineers, and others; 3, Illustrations of new engineering structures, machinery and locomotives; and 4, Editorial Comments on current events and matters of interest to railroad men, the railroad public, and to the engineering profession.

General Railroad News.

The department of Railroad News has, as its importance demands, received a large share of attention. Great labor, expense, and care is given to obtain authentic news of the finances, operations, and results of operation, changes in management, officers, or employes, railroad construction, and railroad work in contemplation, and in this we have very largely the co-operation of railroad officers and civil engineers in all parts of the country. These sources, in addition to the news gleaned from the local newspapers in every district in the United States, Canada, Mexico, and South America, compiled by experts in this office who are thoroughly acquainted with every department of railroad business, and have information which enables them to judge of the truth and value of such reports as come to them, combine to make these columns the most complete and authentic record obtainable.

The news published in THE RAILROAD GAZETTE is thus not only much fuller than can be found elsewhere, but it is much more accurate, being very carefully edited with a view to eliminate all errors possible and to make the matter perfectly clear to the reader. The accuracy attained by the labor and study of editors who devote themselves to the work is further promoted by the watchfulness of an army of readers, some of whom are interested in preventing any mistake concerning each item, and are likely to write to correct it should one creep in. This news is so classified as to be easily referred to, being divided into the departments whose heads are given below:

OLD AND NEW ROADS.

Under this head is given the news concerning the organizations and consolidation of companies, the surveys and contracts which are to be or have been let for new lines, the progress of work on these and on improvments of old roads, reports of meetings of railroad boards and associations, any special developments in traffic, or any changes in regulations, in wages, in hours of work, in forces employed, etc., referable to any particular road. Several thousands of such items are published in the course of the year, varying in length from one line to a column.

This department is most carefully edited, and is not (as news of this kind usually is) a mere series of clippings from newspapers. Very much of the information is gathered from newspapers, it is true, but all this is edited by those who have very full information on the subject; and this enables us to sift that which is important from that which is not, to fix definitely the location of the lines named and to sum up their condition at the time mentioned. Nothing is stated positively unless we are convinced of its truth, though we give reports and rumors for what they are worth. Moreover, we receive a large amount of information directly from the roads, from engineers and other correspondents. We believe that scarcely any noteworthy scheme which has anything more than existence on paper escapes notice in this department.

ELECTIONS AND APPOINTMENTS.

This division records the election of the directors and executive officers of nearly every railroad company in the country, and the appointment of officers of all grades whatever, and it forms a very full directory of railroad officers.

We do our best to give the residence of each, (it is not always possible,) and also to tell what positions they have held heretofore, their relations to other companies, and the names of those they succeeded.

PERSONAL.

Items of news, matters of personal interest concerning

railroad officers, railroad men, and members of the engineering profession are given under this heading.

ANNUAL REPORTS.

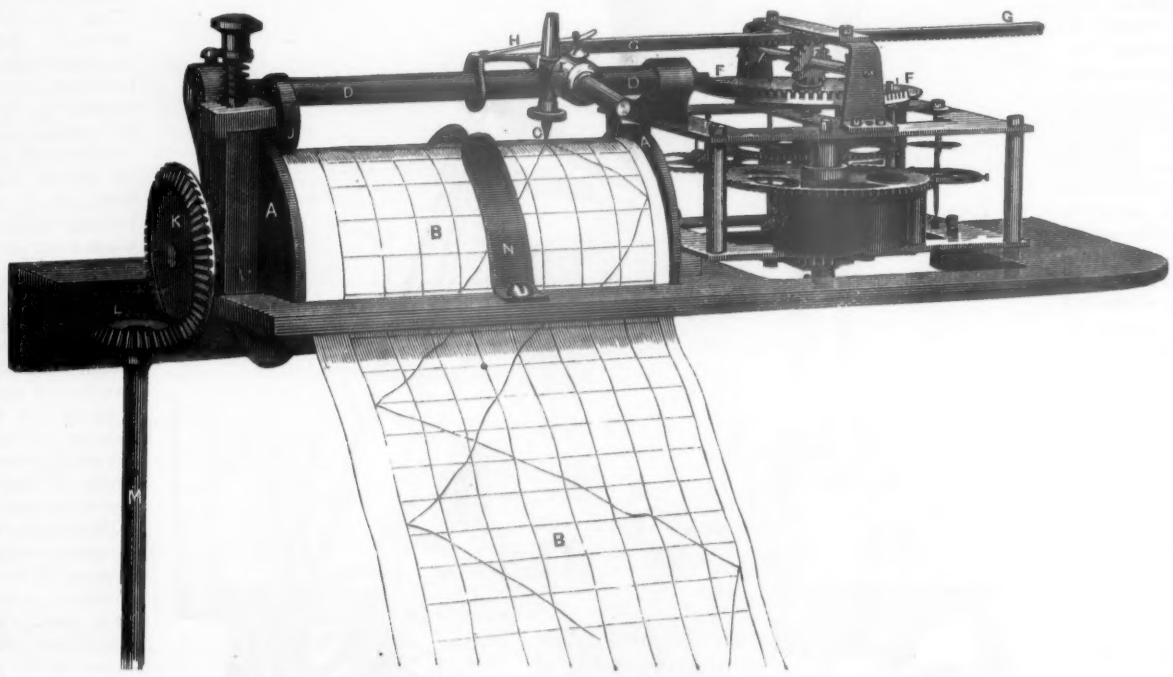
The abstracts of annual reports given here are mostly quite brief and easily read, but they are prepared with great labor with the intention to present as clearly as possible certain salient points, namely: The exact amount of property which the company owns; the exact amount of its stocks and bonds, and other liabilities; the amount of work in train miles and in passenger and freight mile age done during the year reported, and the earnings and expenses of the year. When practicable the amount per mile of stocks and bonds, of earnings and expenses is given, and the receipts per ton and per passenger per mile—facts which are usually more significant to the practical railroad man than the gross statements. The reports of the most important companies are usually given by themselves in some detail, and are frequently analyzed with great care in order to draw from them the lessons which they are capable of teaching, which are often of great value to others than those in the service of the company reporting.

TRAFFIC AND EARNINGS.

In this department we give the returns, weekly and monthly, of such companies as report, with the percentage of increase or decrease in comparison with the same time in the preceding year. Besides this, we give monthly, in our editorial columns, a tabular statement of earnings, with much information concerning the mileage of the roads, the circumstances affecting traffic, etc., not given elsewhere.

THE SCRAP HEAP.

As its name implies, this department contains a variety of matters, mostly concerning machinery, tools, etc., but not unseldom anecdotes of the road and the shop. Morsels of information which all classes of railroad men find it both pleasant and profitable to read are gathered from the different railroad manufactories and shops in this country and abroad and presented briefly under this title.



WYTHE'S SPEED INDICATOR FOR SHOWING THE MOVEMENT OF RAILROAD TRAINS.

NEW PUBLICATIONS.

Books or other publications on matters connected with railroad work, or of interest or value to railroad men, are noticed and criticised honestly, with the endeavor to give the readers of the RAILROAD GAZETTE such an idea of their scope and merit as will enable them to judge of the desirability of procuring them.

Contributions.

The contributors to the RAILROAD GAZETTE are from among the ablest and best-known railroad officers and professional men in this country—experts in the executive, transportation, mechanical and engineering departments. Their discussions in these columns are upon subjects of which they have a practical knowledge, and upon which they are able to impart information and furnish illustrations and proofs from the results of their own experience.

In the letters from contributors during the year 1874 alone have been discussed such questions as the alignment of tunnels from the bottom of a shaft, the action of the Bourdon gauge, American and Fairlie engines in Peru, inspection of track on the Pennsylvania Railroad, cost of the block system, cost of a wooden railroad in South Carolina, cleaning boiler flues, changing point of compound curvature, crossing signals, the cheapness of brakemen, coal dust as locomotive fuel, distance indicators, developing traffic by low rates in England and America, carrying sporting dogs, estimating cost of freight transportation, experiments with car journals, excavations and embankments, elevation of curves, problems in locating railroads, how to run a locomotive when the throttle-valve fails, how to keep nuts tight on fishbars—and so on through the alphabet.

We are not at liberty to name all of those whose communications have appeared in the RAILROAD GAZETTE—sometimes as letters to the Editor, and sometimes as editorials—but among the authors of papers printed in it, many of which were written for it, are:

Mr. Benj. H. Latrobe, late Chief Engineer of the Baltimore & Ohio Railroad.

Mr. Ashbel Welch, long President of the United Companies of New Jersey.

Mr. Albert Fink, Vice-President and General Superintendent of the Louisville & Nashville and Great Southern Railroad.

Mr. Octave Chanute, Chief Engineer of the Erie Railway.

Mr. Wm. H. Brown, Engineer of Maintenance of Way of the Pennsylvania Railroad.

Mr. L. P. Morehouse, Assistant Engineer of the Illinois Central Railroad.

Mr. Thomas C. Clarke, Engineer of the Phœnixville Bridge Works.

Mr. Joseph M. Wilson, Engineer of Bridges and Buildings, Pennsylvania Railroad.

Mr. Charles Paine, General Superintendent of the Lake Shore & Michigan Southern Railway.

Mr. Robert Harris, General Superintendent of the Chicago, Burlington & Quincy Railroad.

Mr. L. J. Fleming, long Chief Engineer and General Superintendent of the Mobile & Ohio Railroad.

Mr. Coleman Sellers, the eminent mechanical engineer.

Mr. James F. Joy, President of the Michigan Central Railroad Company.

Mr. H. A. Towne, Superintendent of Machinery of the Northern Pacific.

Mr. C. H. Hudson, Assistant General Superintendent of the Chicago, Burlington & Quincy.

Mr. Alexander Mitchell, President of Chicago, Milwaukee & St. Paul.

Mr. C. R. Peddle, Superintendent of Motive Power of the Vandalia Line.

Mr. Theodore Cooper, Mechanical Engineer.

Mr. A. P. Boller, Engineer of the Phillipsburg Manufacturing Company.

Mr. Charles Bender, Engineer for the Baltimore Bridge Company.

Mr. James B. Eads, Engineer of the St. Louis Bridge.

Mr. E. D. Mason, Engineer of the Hannibal and the St. Joseph Bridges.

Mr. E. L. Corthell, Engineer of the Louisiana Bridge.

Mr. Ewing Matheson, Engineer of an English bridge firm.

Mr. J. C. Dodge, Chief Engineer of the Chicago, Milwaukee & St. Paul Railway.

Mr. Franklin B. Gowen, President of the Philadelphia & Reading Railroad.

Mr. Joseph D. Potts, President of the Empire Line.

Mr. Richard Potter, President of the Grand Trunk Railway Company.

Mr. T. B. Blackstone, President of the Chicago & Alton.

Mr. J. M. Walker, President of the Chicago, Burlington & Quincy.

Capt. H. W. Tyler, Chief Railway Inspector of the British Board of Trade.

Mr. Charles Francis Adams, Jr., and Mr. A. D. Briggs, of the Massachusetts Railroad Commission.

Mr. C. Latimer, Chief Engineer of the Atlantic & Great Western.

Mr. F. H. Tubbs, Superintendent of Telegraph of the Chicago, Burlington & Quincy.

Mr. Howard Fry, Superintendent of Machinery of the Philadelphia & Erie and late of the Erie.

Mr. W. W. Evans, Civil Engineer.

Mr. John McGee, one of the engineers of the Peruvian railroads.

Mr. Harry E. Sharpe, Secretary of the Railway Association of America.

Mr. Wm. S. Huntington, author of the "Road Masters' Assistant."

Mr. A. M. Wellington, author of "Methods for the Computation from Diagrams of Railway Earthwork."

Mr. Conway R. Howard, author of "Earthwork Mensuration on the Basis of the Prismoidal Formula."

Mr. Lewis W. Leeds, Engineer of Ventilation and author of "Treatise on Ventilation."

Profs. R. H. Thurston and De Volson Wood, of the Stevens Institute of Technology.

Prof. Charles A. Smith, of Washington University.

Mr. J. H. Setchel, Master Mechanic of the Little Miami Railroad.

Mr. Richard H. Buel, Mechanical Engineer.

Mr. John M. Goodwin, Civil Engineer and Inspector of Railroads.

Mr. P. Barnes, Eng'r, of the Edgar Thomson Steel Works.

Mr. J. A. Kingsbury, General Ticket Agent of the Marietta, Pittsburgh & Cleveland Railway.

Mr. E. P. Hannaford, Chief Engineer of the Grand Trunk Railway.

Mr. W. A. Robinson, Locomotive Superintendent of the Great Western Railway of Canada.

Major H. G. Prout, Corps of Engineers of the Egyptian Army.

Mr. W. M. Johnson, one of the engineers of the Texas & Pacific.

Mr. F. N. Finney, Chief Engineer of the Canada Southern.

Mr. F. L. Pope, Electrical Eng'r.

Mr. H. W. S. Cleveland, Landscape Architect.

Mr. George H. Bliss, late Superintendent of Telegraph, Chicago & Northwestern Railway.

Mr. Willard S. Pope, President and Engineer of the Detroit Bridge and Iron Works.

Major Alfred T. Sears, of the Costa Rica Railroad.

Mr. Edward P. North, late Superintendent of the Houston & Great Northern.

Mr. F. B. Miles, Mechanical Engineer.

Mr. Louis Nickerson, C. E.

Mr. G. C. Breed, Purchasing Agent of the Louisville & Nashville Railroad.

Mr. E. T. D. Myers, General Superintendent Richmond, Fredericksburg & Potomac.

Mr. F. R. Firth, late Engineer and Superintendent of the Atchison & Nebraska Railroad.

Mr. Charles Wilson, late Grand Chief Engineer of the Brotherhood of Locomotive Engineers.

Mr. P. M. Arthur, present Grand Chief Engineer of the Brotherhood of Locomotive Engineers.

Mr. Thomas Allen, President of the St. Louis, Iron Mountain & Southern.

Mr. Walter Katte, Engineer of the Keystone Bridge Works.

Mr. James Maurice Thompson, Author of "Practical Field Engineering."

Mr. Benj. D. Frost, Engineer of the Hoosac Tunnel.

Mr. J. D. Hayes, General Manager Blue Line.

Mr. James Charlton, General Passenger and Ticket Agent of the Chicago & Alton Railroad.

Mr. C. H. Latrobe, Associate Eng'r Baltimore Bridge Co.

Mr. W. W. Wright, Engineer of the Nebraska City Bridge Co.

Mr. P. B. Loomis, President Fort Wayne, Jackson & Saginaw Railroad.

Mr. Washington Roebling, Chief Engineer of the East River Bridge.

Mr. Francis Collingwood, Engineer of the East River Bridge.

Mr. T. J. Nicholl, Chief Engineer of the Plymouth, Kankakee & Pacific Railroad.

Mr. C. P. Sandberg, C. E., London.

Mr. A. P. Boller, Engineer Phillipsburg Manufacturing Co.

Mr. Joseph Brown, late President of the Missouri Pacific.

Mr. J. Edgar Thomson, late President of the Pennsylvania Railroad Co.

Capt. F. U. Farquhar, United States Corps of Engineers.

Prof. J. E. Hendricks, Des Moines, Iowa.

Gen. Herman Haupt, C. E.

Mr. Robert F. Fairlie, Inventor of the Fairlie Locomotive.

Mr. Silas Seymour, late Consulting Engineer of the Union Pacific.

Mr. Stephen Powers.

Mr. A. Mitchell, Superintendent Illinois Central Railroad.

Mr. J. A. Anderson, Superintendent Belvidere & Delaware Railroad.

Hon. Wm. J. McAlpine, Hydraulic Engineer.

Mr. Leland Stanford, President of the Central Pacific Railroad.

Mr. A. N. Towne, General Superintendent of the Central Pacific.

Mr. W. E. Chamberlain, Master Car-Builder, Boston & Albany Railroad.

Mr. Wm. P. Shinn, late General Freight Agent, Pittsburgh, Fort Wayne & Chicago Railway.

Mr. W. H. Mills, General Manager Mexican Railway.

Other papers written by locomotive runners, conductors, train dispatchers, accountants and other grades of railroad service have been published. Thus the efforts of the editors are seconded, directly or indirectly, by the writings of just those railroad men whose experience, opinions and counsels are best worth having.

Illustrations.

With each number of the GAZETTE are published engravings of railroad machinery, such as locomotives, cars, shop tools, water stations, &c., or of engineering structures, such as bridges, station buildings, &c., maps, showing location of roads, diagrams of problems in mechanics and engineering, &c., &c.

During the past year a series of articles on the principles, construction and operation of locomotives was published in the GAZETTE under the title of "The Catechism of the Locomotive." These articles were illustrated with 250 engravings, representing different kinds of locomotives and details of construction. These articles will be published in book form and are now in press, and will be ready on January 1, 1875.

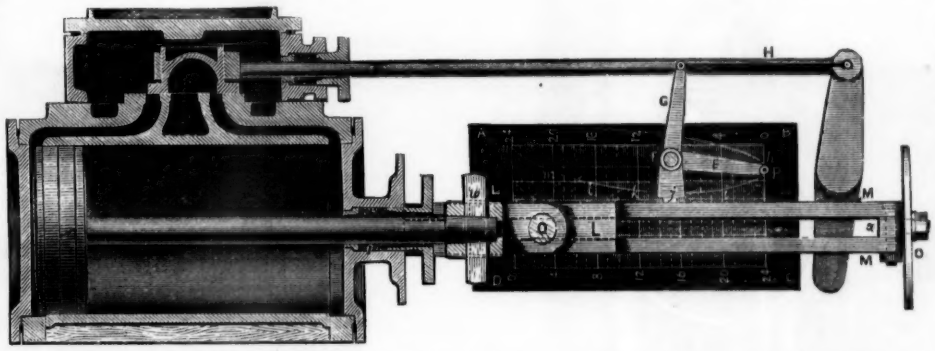
In addition to the 250 engravings published with "The Catechism of the Locomotive" during the year, there were engravings, many of them large and fine, of the locomotives used in making the grades of 528 feet per mile on the Baltimore & Ohio Railroad, a car-wheel boring machine, cylinder boring machine, the Cudworth fire-box, the New York Elevated Railroad, a French freight locomotive (full page), radial drilling machine, locomotive for Elevated Railroad, method of applying the indicator to locomotives, hydraulic brake, several smoke stacks, testing machines, slide valves, a speed indicator, rock drill, water crane, and many others, some specimens of which accompany this circular.

Editorials.

It is the aim of the conductors of this paper to keep its editorial expressions and comments free from any personal bias. Its opinions may be accepted for what they are worth as the results of honest, thoughtful investigation. They are not in any case consciously influenced by a desire to favor or injure any corporation or individual. We give in our editorial columns our own opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but they will not be recommended editorially, either for money or in consideration of advertising patronage.

In addition, the RAILROAD GAZETTE makes accessible to American railroad men the writing on railroad matters most applicable to their wants contained in English, French and German periodicals and new books. There is a much larger literature of this kind in French and German than in English, and the RAILROAD GAZETTE aims to cull from this literature whatever is worth most to American railroad men.

The journal is pre-eminently a record of what is being done in the railroad world in all departments. It gives information of the organization of new companies; of leases, consolidations and other agreements among companies; of the letting of contracts and the progress of construction; of elections of directors and the appointments and resignations of railroad officers; it summarizes the reports of most of the railroad companies, giving quite briefly and clearly an analysis of the business of the year and of its results; while the reports of the most important companies, whose operations are interesting in all parts of the country, are analyzed more thoroughly and minutely than in any other publication in the world. This record of railroad progress extends to machinery, inventions and manufactures of railroad material; to the new laws passed concerning railroads, and the more important decisions of the courts. The files of the paper, indeed, are intended to contain a complete history of railroad affairs in the United States, and in other countries so far as they may affect railroad business in this country, so that he who preserves a file of the RAILROAD GAZETTE will have, carefully indexed and easy to refer back to, a complete record of railroad progress.



INSTRUMENT FOR INDICATING GRAPHICALLY THE MOTION OF A SLIDE VALVE.

Some of the Subjects Treated in One Year.

To give a better idea of the material contained in the RAILROAD GAZETTE, we mention the following as among the subjects treated in it during the year 1874:

A very full discussion of the question of paying commissions on sales of tickets, which was agitated so strongly during the year.

A complete record in the second number of the year of all the railroads and parts of railroads constructed in the United States during the year 1873, describing each one separately.

A record for each month of all the accidents to railroad trains reported, with a brief description of each, narrating the cause when possible. This is the only record of railroad accidents published covering the whole United States.

A table each month of the earnings of all railroads in the country which report. This table, unlike any other, gives not only the gross receipts for the current and the preceding year, but also the mileage of each road for each year, the earnings per mile, and the percentage of increase or decrease. A similar table is given for the part of the calendar year which has elapsed when the table is published.

All the circulars of inquiry addressed by the committees of the Master Car-Builders' and Master Mechanics' Associations to the members of those associations, and quite full reports of their annual conventions.

Reviews of the chief State railroad reports, with selections of their most important parts.

The important paper of Mr. Octave Chanute, Chief Engineer of the Erie Railway, on "The Elements of Cost of Railroad Freight Traffic," and a large part of an extremely valuable work by Mr. Albert Fink, Vice-President and General Superintendent of the Louisville and Nashville Railroad, entitled "An Investigation into the Cost of Transportation on American Railroads," and one by Mr. L. P. Morehouse, Assistant Engineer of the Illinois Central, "Concerning the Cost of Transportation on Railroads," and, also, the report of a committee of the New England Superintendents' Association on "The Cost of Transporting Freight to and from Boston."

A very full discussion of the comparative merits of English and American bridges, in which Mr. Ewing Matheson, of England, and several prominent American bridge engineers took part.

A number of articles on the care of roadbed and track, by Mr. William S. Huntington, author of the "The Roadmaster's Assistant," the standard work on the subject.

The long and elaborate report of the Committee of the American Society of Civil Engineers on "The Form, Endurance and Manufacture of Rails."

A valuable paper on "Crossing Signals," by J. M. Goodwin, C. E.; and one on "Grade Crossings," by T. Appleton, C. E.

An extremely interesting historical sketch by Benjamin H. Latrobe, C. E., describing the working of the temporary steep gradients of the Baltimore & Ohio Railroad of *five hundred and twenty eight feet to the mile*, with a cut of the locomotive used, and a map of the grades.

In the editorial columns there have been discussions of the comparative merits of American and European bridges, in connection with the letters on the subject; on the question of rapid transit in cities; on narrow-gauge railroads; "American and English Locomotives," "Locomotive Reports and Performances," "Size of Car Journals," "Slide Valves," "Mechanics of Driving Wheel Action," "Friction and Lubrication," "Coupling Cars," "Check Chains," the proposed mechanical laboratory, patents, and many more relating to engineering and mechanics; on the "Threatened Strike of Locomotive Engineers," the Convention of the Brotherhood, etc.; on the defaults in payment of railroad bonds and the policy of foreclosing mortgages; on the movement of different crops, such as grain, cotton and provisions, grain deliveries in New York, etc.; on many matters connected with the science of transportation and its relations to the community, the cost of transportation, railroad legislation, etc., including such articles as "What Are Reasonable Profits," "The Railroad Problem," "The Cost of Transportation," "Pay for Postal Car Service," "A Phase of Competition," "The Waste by Useless Railroads," "Congress and Transportation," "The Growth and Value of Western Traffic," "The Wisconsin Railroad Decision," "The Double-Track, All Steel, Exclusively Freight Railroad," "The Legitimate Cost of Railroads," and many others.

Each number of the RAILROAD GAZETTE has, including advertisements, from 20 to 28 pages, of the same size as the pages of this prospectus, and the numbers for the year form a large quarto volume.

The character of the GAZETTE in the past is the surest guarantee of what it will be in the future. Its editors will only add that they will not only aim in the future to sustain it, but, with increased experience, endeavor in the coming year to make it more valuable than ever before to all classes of railroad men.

TERMS.

The subscription price of the RAILROAD GAZETTE is $4 a year; ten copies, $35. By a recent Act of Congress publishers of newspapers are required (on and after January 1, 1875) to prepay all postage at the mailing office. Subscribers, therefore, should remit 20 cents a year additional for each subscription, since we prepay at the New-York office the postage which subscribers have been accustomed to pay at their own offices.

Remittances should be made either

(1) by a draft on a New-York bank, (please do not send checks on banks outside of New York,) or

(2) By a Post-office Order, which can be procured at most Post Offices, or

(3) By enclosing the money in a letter and REGISTERING the letter. This can be done by applying to any postmaster, and prepaying by stamps the registration fee, which is 8 cents, and which SECURES SAFETY.

SPECIMEN COPIES FURNISHED FREE.

Address, THE RAILROAD GAZETTE,

73 Broadway, New York.

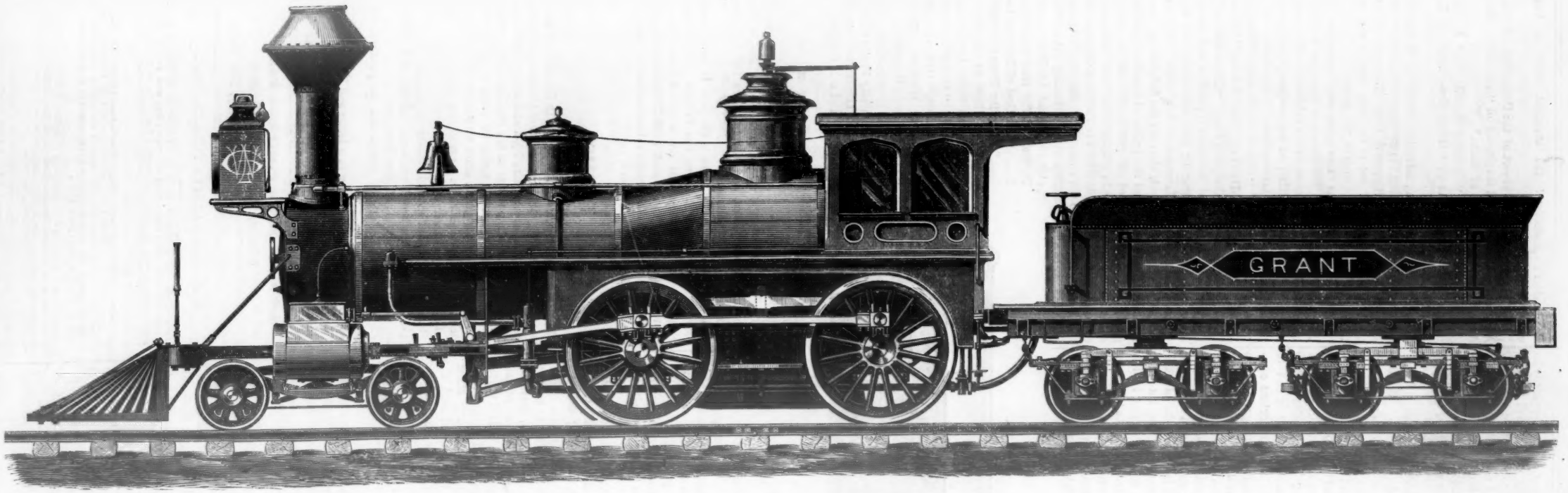
RAILROAD GAZETTE PUBLICATIONS.

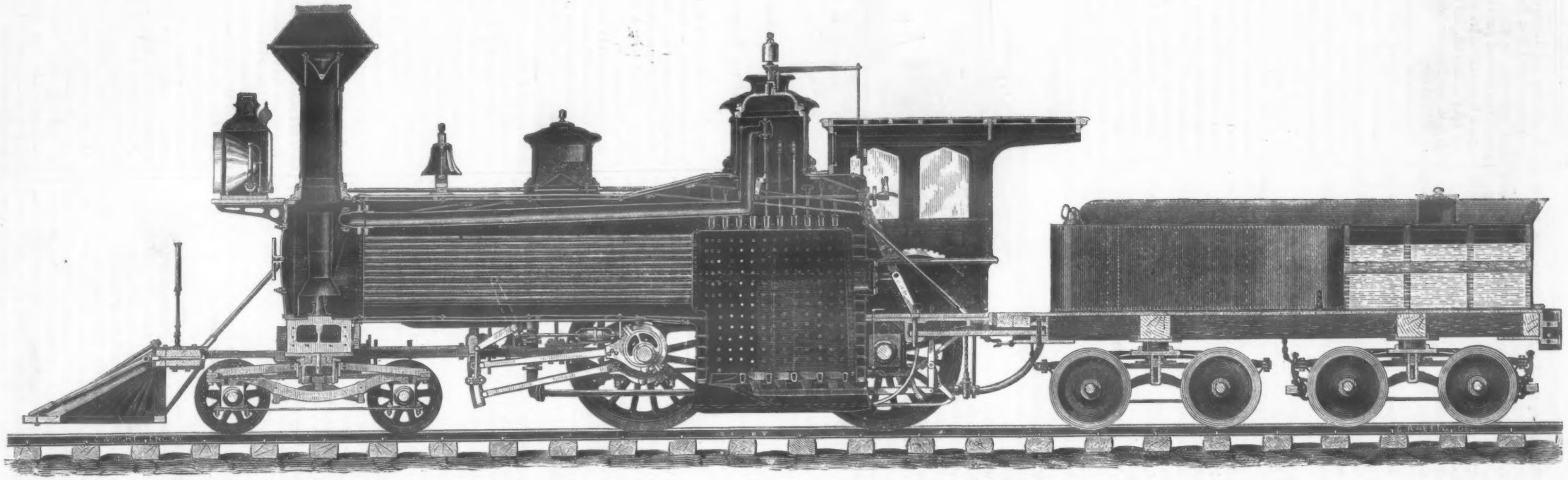
CATECHISM OF THE LOCOMOTIVE, by M. N. FORNEY, *Mechanical Engineer:*—A book of 650 pages, with 250 engravings and twenty full-page plates of various styles of locomotives. The most complete treatise on the construction and operation of the locomotive. Price, postage paid, $2.50.

THE ROADMASTER'S ASSISTANT AND SECTION-MASTER'S GUIDE, by WM. S. HUNTINGTON:—A careful and minute account of the most approved methods of constructing permanent way and keeping track in good repair. Mr. Huntington is a roadmaster of 25 years' experience. Price, postage paid, $1.00.

ENGLISH VERSUS AMERICAN BRIDGES:—A pamphlet of 30 pages, being a discussion by eminent English and American engineers of the comparative merits of the English and American systems of bridge building. Price, postage paid, 25 cents.

CONCERNING THE COST OF TRANSPORTATION ON RAILROADS, by L. P. MOREHOUSE, *Assistant Engineer* of the Illinois Central Railroad:—A pamphlet of 17 pages, being a thoroughly scientific analysis of this important subject. Price, postage paid, 25 cents.





STANDARD AMERICAN LOCOMOTIVE, BY THE GRANT LOCOMOTIVE WORKS, PATERSON, NEW JERSEY.